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ABSTRACT

This book was written to help teachers to plan and implement an effective addition-subtraction basic fact program. When it is determined that children have gained an adequate concept for an operation, the next long-range goal is fact memorization. Children need to respond quickly and correctly to number facts and retain this learning over time. To achieve this goal, instructional suggestions are presented in this teacher resource to help children develop strategies and thinking patterns for answering unknown facts. The instructional sequences and activities in this resource relate to memorizing facts which are grouped for recall. A major suggestion made in this resource is to delay studying a group of subtraction facts until related addition facts are mastered. Children learn best by manipulating materials which model the thinking to be acquired. Whenever possible, the initial approach with each new set of facts in this resource is hands-on and incorporates oral language prompts. This document includes discussions of the teaching and learning strategies used by this program, sample lessons, activities, extension and modifying activities, home involvement activities, and a list of references. Appendices include jiffy quizzes, materials lists, and card sets for the basic progfam. (CW)

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Basic Number Facts —

Strategies for Teaching and Learning

Book I: Addition and Subtraction

1 1 =
2 + 2 =
Easy Doubles
6 + 6 =
3
9 +

An Activity Based Program

A Teacher Resource
by
Carol A. Thornton

BEST COPY AVAILABLE

Dedicated to my husband Denis, and daughters

Stephanie and Jennifer

Photographs by

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Jerry Liebenstein

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Preface

This book is written to help teachers of young primary school children, as an aid for planning and implementing an effective addition-subtraction basic fact program. When it is determined that children have gained an adequate CONCEPT for an operation, the next long-range goal is fact memorization. Children need to respond quickly and correctly to number facts given them, and retain this learning over time.

To achieve this goal, instructional suggestions are presented in this teacher resource to help children develop strategies or thinking patterns for answering unknown facts.

Developmentally, young primary children are at a level where they will learn best by manipulating materials which model the thinking to be acquired. The initial approach with each new set of facts, therefore, is "hands on." Also, because the internalization of thinking patterns often hinges upon children's abilities to "talk out" as they do and learn, oral language prompts are incorporated to which children can relate.

Examples:
- "Start big and count on."
- "See a double? What picture will help?"

These and other language prompts help children to help themselves when they forget and are an important part of the program.

Drill is a necessary element of the instructional suggestions contained in this resource. Recommendations on when and how to provide effective drill and practice in the addition-subtraction number fact are provided.

A major suggestion made in this resource is to *delay studying a group of subtraction* facts until RELATED addition facts are mastered. It is recommended, for example, that children do not study facts such as 9-1, 6-2, or 8-3 (and other -1, -2, -3 facts) until they have memorized the addition Count Ons: facts such as 1+8, 2+4, and 3+5 having 1, 2, or 3 as an addend.

The rationale is that children will be able to use addition to answer or check subtraction facts only if they know the addition facts well. Typically, it is desirable NOT to present addition and related subtraction facts in the same or in back to back units of instruction. Children need time to consolidate learning before being asked to apply it.

In contrast to the long-standing "sums to 10" approach, readers will note that a different method of grouping facts is presented in this teacher resource. This new organization is based on ways CHILDREN find easy to study and recall facts, rather than on traditional groupings. Fact groups such as Count Ons, Count Backs, Doubles, 10-Frame facts, and others which are new to teachers and parents, simplify the learning task for children. The instructional sequences and activities in this resource relate to memorizing these facts, grouped by strategy for recall. They are the outgrowth of fifteen years of systematic interaction with and research involving children and their teachers in the United States, Australia, and Canada.

The author is most grateful to Sally Tucker and Judy Wells who have prompted the writing of this text and have, over the years, shared the responsibility of teaching children and teaching teachers many of the ideas presented. I am indebted to the cooperation, dedication, enthusiasm, inspiration and patience of these colleagues—and that of all the children and teachers; administrators and mathematics educators; staff and assistants; friends and family—whose support has culminated in this attempt to make the teaching and learning of basic facts easier and FUN!

Toward a Sound Basic Fact Program: A Philosophy of Teaching

2 + 7, 13 - 5, 9 + 4: A child's ability to quickly and accurately answer these and other number facts (involving at least two 1-digit numbers) is a basic stepping stone to success in other aspects of the elementary school mathematics curriculum. Written and mental computation, computational estimation, and elements of problem solving rely on this skill. Mastery of the basic "number facts" is not always easily and quickly attained. It is not unusual for children in and beyond third grade to finger count or guess to obtain answers to unknown facts.

The school mathematics curriculum today is fuller than ever with demands to provide quality teaching in key areas: problem solving and applications, mental computation and computational estimation; and the processing and interpretation of data, both graphically and with appropriate use of technology. Teachers are being challenged to develop more adequate understandings of mathematical concepts and to build "number sense" in practical and problematic situations.

To help students keep pace with the demands of today's curriculum and allow time for its more challenging aspects, there is a need to be more *efficient* in the teaching and learning of basic facts. Two major questions confront teachers:

- What approaches to number fact learning will bring students to a usable degree of mastery faster and foster better retention?
- What model of fact learning also reinforces concept learning and the development of number relationships; and has a natural extension to mental mathematics and problem solving?

The National Council of Teachers of Mathematics in its *Curriculum and Evaluation Standards for School Mathematics* (1989) has endorsed a model which emphasizes "thinking strategies" for teaching basic facts. Baroody (1985) suggested that this approach to number fact learning and teaching typically provides more effective results than a drill approach alone. These positions are aligned with the theoretical model proposed by Case (1985) which may be used to explain the advantage of the strategy approach for promoting quicker learning and longer retention of basic facts.

Case's information processing model is based on the concept that the capacity of a child's short-term storage space, *working memory* , is limited. His research suggests that the capacity of one's working memory is increased by "chunking"--that is, by grouping or relating data for efficient storage and retrieval. As a result, greater amounts of data can be processed in one's working memory at any given time, and the transfer to long term memory is accommodated.

"Chunking" is the basis of a strategy approach to teaching and learning basic facts. Research evidence since the 1930's (e.g. Brownell and Chazal, 1937; Thiele, 1938; Swenson, 1949; Thornton, 1978; Rathmell, 1978; Leutzinger, 1979; Thornton & Toohey, 1985) are consistent with NCTM endorsement of this approach.

Teachers themselves are beginning to recognize how effective the "strategy" model of teaching basic facts can be for all types of students. For high ability students, this approach provides an early focus on number relationships, patterning, and related generalizations. For other students, the emphasis on teaching strategies for recall before drill places children in a better position to help themselves when they forget. This emphasis also increases the likelihood that subsequent drills will "speed up" efficient processes instead of cumbersome ones for answering unknown facts.

This author's concern extends beyond the idea of merely teaching isolated strategies to a focus on:

- how carefully each strategy is taught;
- how the various strategies are sequenced;
- how drill is interfaced in a balanced manner in the basic fact program; and
- how number fact work is related to what teachers already are doing to accomplish major goals in school mathematics.

The emerging objective is not only to use techniques, hints, or strategies which help children learn *certain groups of facts* , but also to develop a **sound basic fact program** which:

- will help children learn *all facts* ;
- will emphasize the *process* for determining unknown facts as well as the answer;
- will provide for systematic, on-going drill and practice; and
- will contribute significantly to major goals of today's mathematics curriculum.

This teacher resource has been written from the perspective that it is possible to improve number fact learning in the primary grades in a way which relates to this objective. A major thrust has been to **present a framework** which teachers can use as a springboard for improving their present basic fact program, no matter what mathematics textbook curriculum is used. The six major aspects of this framework are introduced in the section which follows.

A BASIC FRAMEWORK FOR TEACHING AND LEARNING BASIC FACTS: SIX TYPES OF ACTIVITIES

Goal: Fact memorization. Adequate concept understanding is assumed.

For all but very good memorizers, it is helpful to:

Look Ahead
Teach a Strategy
Use the Strategy
Choose What Will Help
Speed Up
Check Up

1. LOOK AHEAD to:
    - tomorrow;
    - three weeks from now.

    Build prerequisites which help children learn techniques and thinking patterns for learning unknown facts.

2. TEACH STRATEGIES which help children memorize unknown facts. Action-based teaching is the key. Thinking strategies children find helpful are summarized on page __ . Group facts by strategy for recall, rather than by size of sum.

3. Help students USE the new strategy accurately.

4. Be sure children can CHOOSE when it is appropriate to use the new strategy, and when it is not.

5. Provide short, daily drill activities to SPEED UP response to the point of automatic recall. In every classroom to about grade 4 and in remedial settings, daily drill on facts previously presented should occur. Not to do so would be the exception. The tendency is to neglect both addition and subtraction drills while working on multiplication; to neglect multiplication drills when focusing on division. Rather, lower grade teachers might plan a short addition drill near the beginning of each math period, and a short drill on a different set of facts (subtraction, multiplication, or division) near the end. Alternately, a short drill might occur at some other transition period during the day.

6. CHECK UP on fact mastery through regular six- or eight-point fact quizzes (and occasional, longer timed tests).

Thinking Strategy Terms

1. **Add to Check facts** refers to the addition fact related to a given subtraction fact.
   Examples: 7 + 2 = 9 is the "add to check" fact for 9 - 7 = 2.
   9 - 7 = 2 because 7 + 2 = 9.
   (Also accept 2 + 7 = 9.)
   Verbal Prompt: "When you know addition, you know subtraction, too."

2. **Count Backs** (count downs) are the -1, -2, -3 subtraction facts.
   Examples: 9 - 2 = 7; 8 - 3 = 5; 4 - 1 = 3.
   Verbal Prompt: "See -1, -2, -3? Start big and count back."
   Note: Some children think of the 10-frame for all Easy 10-Frame facts, including 10-1, 10-2, 10-3. See #11 below.

3. **Count Ons** are addition facts in which you are adding 1, 2, or 3.
   Examples: 4 + 3 = 7; 5 + 1 = 6; 2 + 6 = 8.
   Verbal Prompt: "See a 1, 2, 3 in addition? Start big and count on."

4. **Count Ups** are subtraction facts where the "numbers are close."
   Examples: 9 - 7 = 2; 8 - 5 = 3; 7 - 6 = 1.
   Verbal Prompt: "When the numbers are 'close neighbors', count up."
   Note: Some children think of the 10-frame for all Easy 10-Frame facts including 10-9, 10-8, 10-7. See #11 below.

5. **Doubles (addition/subtraction)** are facts in which both addends are the same.
   Examples: 4 + 4 = 8; 7 + 7 = 14 (addition doubles) 8 - 4 = 4; 14 - 7 = 7 (subtraction doubles.)
   Verbal Prompt: "A double? No trouble. Think of the picture."

6. **Doubles + 1** are those facts in addition and subtraction that are "one more than" a double.
   Examples: 5 + 6 = 11; 7 + 8 = 15; 11 - 5 = 6; 15 - 7 = 8.
   Verbal Prompt: "When numbers are 'next door neighbors', think Doubles to help."

7. **Families of facts** are the related facts (addition-subtraction) that have the same whole and the same parts.
   Examples: 5 + 4 = 9; 4 + 5 = 9; 9 - 4 = 5; 9 - 5 = 4.
   Verbal prompt: "To know one is to know all in the family."

8. **Magic 9s** are the addition facts having 9 as one addend. Because there are several patterns (number tricks) useful for answering the +9 facts, and because many children associate tricks with magic, the term "Magic 9s" has been generated.
   Examples: 9 + 4, 6 + 9.
   Verbal Prompt: "See a 9? Think. What pattern will help?"

9. **Make 10, Add Extra facts** are the five harder addition facts (7+4, 7+5; 8+4, 8+5, 8+6) that can be solved quickly by visualizing greater addend in the frame, filling it, then adding the extras.

10. **Partner facts** are two related subtraction facts with the same whole and the same parts.
    Examples: 9 - 2 = 7 and 9 - 7 = 2 are partner facts.
    First one masters an easy group of subtraction facts. THEN one can use these easier, known facts to help learn a whole new set of harder, unknown facts.

    Referring to the example above : the -2 Count Backs are relatively easy for many children. When the -2 Count Backs are well consolidated some children can learn to use them to derive answers to related but unknown partner subtraction facts like 9-7, a Count Up. Because the shortest counting method for Count Backs is directly opposite that for Count Ups, children are easily confused if these facts are taught in "close" lessons. This is NOT recommended.

    Verbal Prompt: "When you know one, you really know two!"
    "Same whole, same parts. They make good partners."

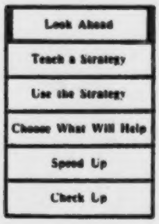
11. **10-Frame facts** are those addition and related subtraction facts that can be easily be modeled in the 10-frame.
    Examples: 6+4 and other 10 sums; 5+4 and 4+5 (all but one in the frame; 10-4 (or 10 minus any other 1-digit number); and 9-4.
    Verbal Prompt: "See 10? Think of the 10-frame."

12. **10 Sums** are addition facts having a sum of 10.
    Examples: 8 + 2 = 10; 6 + 4 = 10.
    Verbal Prompt: "Think: 'What 2 numbers fill the frame?'"

13. **Turnarounds** are commutatives.
    Examples: 8 + 7 = 15 and 7 + 8 = 15..
    Verbal Prompt: "Turnarounds in addition give the same answer. When you know one fact, you really know two."
    Note: Turnarounds in subtraction do not give the same answer.

14. **Zero Finger facts** are those subtraction facts which have teen minuends.
    Examples: 13 - 5, 16 - 7.
    Verbal Prompt: "Take from 10, add extra."

    Note: Some children use their finger to place a "0" (zero) over the ones digit of the minuend. For 13-5, for example, this helps them think of 13 as 10 and 3 when they "subtract through 10" for harder facts.



LOOK AHEAD Activities in the Basic Fact Program . . .

. . . to teach or review important prerequisites.

LOOK AHEAD—to tomorrow, to three weeks from now. What basic facts are unknown and need to be memorized? Some students in our classes are "good memorizers" and need only be told to "study." We typically can anticipate that other students will have difficulty memorizing certain facts.

Concept understanding and place value concepts and skills are assumed to be very important prerequisites to any memory work with facts. If teaching or reteaching is required, it is helpful to plan ahead so that when the time comes to help students learn strategies for remembering certain groups of facts, teaching will flow smoothly.

Check Concept Understanding

Memory work for facts should begin only when children reasonably understand the concept for each operation involved. Checking whether children have developed "operation sense" involves teacher observation and probing in several related situations.

- Given a "real world" addition or subtraction problem, can children physically model or "talk through" the problem in a meaningful way?

- Given a written expression such as 3 + 4 or 7 - 2, do children exhibit understanding of the part-part-whole concept in the way they talk through or physically model finding a solution?

- After children write an answer to a simple number combination, can they:
  — use countable objects to show the answer "makes sense"?
  — tell, write or draw a story based on numbers from the problem?

- Given a mix of oral problems based on situations common to their experience, can children tell which operation button on a calculator could be used to solve the problem?

Children's understanding of the concept of addition or subtraction can grow as their experiences give them a broader basis for comparison and use. Children gain a greater perspective on addition, for example, when they begin to grasp its relation to subtraction. It takes time for children to recognize and use relationships like the effect on the product of increasing a factor by one, or the inverse relation between addition and subtraction.

Similarly, it takes time for children to develop a broad conceptual base and adequate skills related to place value and "number sense." Many of the thinking patterns encouraged in this resource relate to students' abilities to recognize certain patterns and relationships between numbers. Children who have been encouraged to explore and investigate relationships between numbers more readily approach number fact work from a problem solving perspective: "I don't know the answer to that one, but I can work it out."

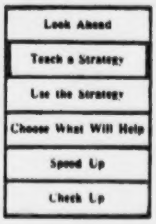
Providing ample time for appropriate concept-building experiences related to the operation—addition or subtraction—and to number is critical. Each year anew, it is important to slow the shift to fact memory work to attend to these important prerequisites.

Review or Teach Other Prerequisites

In addition to concept and number work, it is important to systematically check, then review or teach other important prerequisites to success. These prerequisites include the following skills:

For ADDITION, check:	To help later with:
1. Counting up skills (into teens).	Count Ons in addition,
2. Auditory recognition of (1, 2, 3) numbers said.	in subtraction Count Ups
3. Visual imagery for 10-frame: "How many in the frame?" "How many needed to fill the frame?"	10 sums, 10-facts, 4+5, 5+4, 9-5, 9-4

For SUBTRACTION, check:	
1-3 above.	
4. Counting back skills (from teens, too.)	Count Backs in subtraction
5. MASTERY OF RELATED ADDITION FACTS.	All subtraction facts



TEACHING AND LEARNING STRATEGIES in the Basic Fact Program:

What Will Help?

Help students master unknown facts. Group facts by strategy for recall, then explicity teach strategies which make memorization easier. The following strategies have proved helpful to many students. The sample addition and subtraction lessons in this resource teach these strategies.

Useful Strategies for Learning Unknown Addition Facts

Popular strategy	Samples of these facts
• See 1,2,3 in addition? Start big and count on. • See a)? Make no change.	Count Ons (+1,+2,+3 facts: 2+6, 9+3,...) Zeros (6+0, 8+0,...)
• Think of the picture. • Think of the 10-Frame • See a 9? Think. What pattern will help?	Doubles (4+4, 7+7, ...) 10-Frame facts (6+4, 5+4 (all but one in the frame) Magic 9s (5+9, 9+7, ...)
• When numbers are next door neighbors, think of the Double. • Make 10, Add Extras. (unknown facts like 7+5, 6+8	Doubles + 1 (5+6, 6+7,...) Make 10, Add Extra facts having 7 or 8 as an addend)
• Remember, in addition, turnarounds have the same answer. • Use an addition fact I know	Commutatives (8+3=11 and 3+8=11,...) Harder facts (9+5=14, so 8+5=1 less (13))

Useful Strategies for Learning Unknown Subtraction Facts

Popular Strategy	Samples for these facts
• See -1,-2,-3? Count back.	Count Backs (-1,-2,-3 facts: 11-3, 9-2, ...)
• Take all, leave none. Take none, leave all.	Zeros (6-6=0; 4-0=4)
• Think of the picture	Subtraction Doubles (16-8, 12-6,...)
• Think of the 10-Frame	10-Frame facts (10-6, 10-4, 9-5, ...)
• When numbers are close neighbors, count up.	Count Ups (11-9, 9-6, ...)
• See a 9? Think. What pattern will help?	Magic 9s (14-9, 16-9,...)
•*Use an addition fact I know.	ALL facts (12-4=8 because 4+8=12, ...)
• Use a subtraction fact I know.	Facts "close to a 10 (10-4=6, so 11-4=1 more (7)); a Subtraction Double (12-6=6, so 13-6=1 more (7); a Partner fact (9-2=7, so 9-7=2); and others.
• Use my "zero" finger.	For teen minuend facts (13-5, 16-7, ...)

*Most important goal!

Facts Grouped By Strategy For Recall*

100 Addition Facts**

Easy Facts (84)

- Count Ons: 1 + (1,2,3,4,5,6,7,8,9);
  (45**) 2 + (2,3,4,5,6,7,8,9);
  3 + (3,4,5,6,7,8,9)
- Zeros (19): 0 + (1,2,3,4,5,6,7,8,9)
- Doubles (6): 4+4, 5+5, 6+6, 7+7, 8+8, 9+9
- Easy 10-Fram (4): 6+4, 5+4

Magic 9s (10): 9 + (4,5,6,7,8)

Harder Facts (16)

Doubles +1 (6): 5+6, 6+7, 7+8

Make 10, Add Extra facts:
(10): 7 + (4,5);
8 + (4,5,6)

100 Subtraction Facts

Easy Facts (74)

- Count Backs (27): (10,9,8,7,6,5,4,3,2) - 1; (11,10,9,8,7,6,5,4,3) - 2;
  (12,11,10,9,8,7,6,5,4) - 3
- Zeros (19): n-n, n-0 (n = any number, 0 through 9)
- Doubles (6): 18-9, 16-8, 14-7, 12-6, 10-5, 8-4
- 10-Frame facts (7) 10 - (9,8,7,6,4) and 9-5, 9-4
- Count Ups (15): (12,11) - 9; (11,9) - 8; (9,8) - 7; (9,8,7) - 6; (8,7,6) - 5;
  (7,6,5) - 4

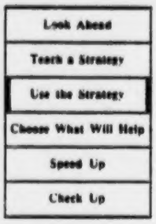
Harder Facts (26)

- Addition Will Help/Zero Finger facts (26): (17,16,15,14,13) - 9;
  (17,15,14,13,12) - 8; (16,15,13,12,11) - 7; (12,14,13,11) - 6;
  (14,13,12,11) - 5; (13,12,11) - 4

Note: There are patterns for subtraction 9s. And, for some facts, children use known subtraction facts to help.

*** Once facts are introduced in Teach Strategy, Choose and Use activities include them systematically in daily Speed Up activities.**

**** Includes addition Turnarounds.**

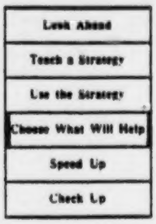


USE Activities in the Basic Fact Program

After children have learned a strategy for deriving answers to a group of unknown facts, a first instructional emphasis is assuring that they are *using* the technique or thinking pattern correctly. In recognition of this goal, a class of activities identified as "USE" activities follow the teaching of every strategy in this teacher resource.

USE activities are transitional in the sense that they move the child slowly away from the concrete objects or pictures typically used to model or stimulate efficient thinking patterns in the TEACH STRATEGY activities. A frequent tactic is to have children write answers to unknown facts, then use these objects or pictures only to check their answer. This approach reinforces the desired thinking pattern and typically nurtures further understanding for the operation involved.

USE activities are characterized by frequent use of the verbal prompts highlighted beneath the title of each of the sample lessons in this resource. The TEACH STRATEGY discussion on page 10 summarizes these verbal prompts, which serve as verbal clues for thinking quickly and efficiently to derive answers to unknown facts.



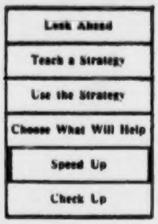
CHOOSE Activities in the Basic Fact Program

Throughout the sample lessons of this resource, CHOOSE activities are incorporated to further reinforce retrieval strategies which have been taught. The focus of these activities is to assure that children can select appropriate strategies for solving facts they do not know. CHOOSE activities characteristically place children in decision making situations. Examples include:

- "Select and do just the Counts Ups (or some other specific groups of facts)."
- "Hold thumbs up if the card I show is a Count Back (or some other specific type of fact)."
- "From the addition cards on the chalk tray, find the fact that checks the subtraction fact you picked up when you came into the room.
  ... Good! 16 - 8 = 8 because 8 + 8 = 16. " That's an easy Double."

During CHOOSE activities, teachers frequently use thinking strategy terms like those found on previous pages. They give verbal prompts when children need them like those highlighted beneath the title of each sample lesson to reinforce the thinking pattern or strategy being developed.

When carrying out CHOOSE activities with children, teachers are encouraged—as always—to be accepting of correct, efficient alternative strategies children propose for deriving answers to unknown facts. More capable students tend to use more sophisticated thinking patterns than other children.



SPEED UP Activities in the Basic Fact Program

The goal of this teacher resource is to help children MEMORIZE basic addition and subtraction facts. Teaching and learning retrieval strategies and incorporating related Use and Choose activities is a means to this end. It is not and end in itself.

When it is clear that children know how to derive answers to unknown facts in an efficient and accurate manner, the instructional emphasis then shifts to drill and practice. The key is **balance**. If instruction moves too fast, efficient thinking patterns and techniques will not be internalized and used by the children. On the other hand, if instruction moves too slowly through the easier facts in any given school year, there is little time left for help where children need it most: on the harder facts yet to be learned.

In addition to pacing, a second issue arises: that related to *daily* drill. A common tendency is to neglect addition facts while subtraction is being studied; or to lay both addition and subtraction facts aside while introducing multiplication. This is not recommended.

Throughout the primary and into the intermediate grades children need regular, systematic review on number facts. **"Less is best, more often."**

From this author's perspective, once a group of facts has been presented through Strategy, Use and Choose activities, those facts should be systematically included in a brief, daily drill activity or exercise.

When number facts for all four operations have been introduced in a school year, the recommendation is to rotate the focus of the *daily* drill periods, so that number facts from all operations are systematically included. Typically, number facts from different operations would not be mixed in an activity or exercise until facts are mastered. These drills might occur as part of or separate from the math period.

Toward this end some teachers keep a shoebox of flashcards handy for those brief, sometimes unexpected moments of free time which occur during transition periods throughout the day. Cards could include many topics: reading vocabulary, spelling words, . . . and math facts. Some teachers write directions for a fun SPEED UP activity on the lead card of each set of facts. At a moment's notice, this SPEED UP activity can be carried out by the teacher (or substitute teacher).

General guidelines for drill and practice which have been incorporated into the SPEED UP activities of this resource are given below. The assumption is that, in general, the "best" drill is that which:

- Comes after Look Ahead, Teach Strategy, Use and Choose activities.
- Is carried out on a daily basis.
- Is short.
- Is motivating and varies a bit, one day to the next. (Avoid using flash cards in the SAME WAY, day after day. Be creative!)
- Actively engages ALL students. (Note that popular activities like "Around the World" and most team activities do not do this. Only the person responding or the next in line is forced to stay on task.)
- Involves the mind set that: "I'm here to memorize these facts." (Child's perspective)
- Emphasizes: "I know you can do it!" (Teacher's perspective)
- Deemphasizes hints and clues; emphasizes speed.
- Focuses on only a few new facts along with other, easier, review facts during a session.
- Systematically includes all facts previously memorized.
- Provides immediate/quick feedback on whether a response is correct and makes the correct answer available.
- Praises students for their EFFORTS to memorize.
- Is tied to an assessment of student progress. (Refer to the CHECK UP ideas below, particularly to ideas for using the Class Cross Out Chart.)

Look Ahead
Teach a Strategy
Use the Strategy
Choose What Will Help
Speed Up
Check Up

CHECK UP in the Basic Fact Program

Quizzes and timed tests are used to assess student progress toward learning the basic facts. The following questions are those asked most frequently by teachers relative to this assessment.

1. **When are facts "mastered"?**

   Basic fact mastery involves giving *correct* answers *quickly* (normally within 2 seconds), and being *consistent* in this performance over time. Any assessment in the area of basic facts would consider these criteria.

2. **What do written timed tests really tell us about fact mastery?**

   Unless individually monitored, these tests only tell the number of facts a child can correctly answer within a given length of time. They don't tell us which facts are memorized and which are calculated. They don't tell us *how* answers to unknown facts are derived. They do provide a good starting point for instructional planning by indicating which students are "pretty good" and which students need a lot of help in the area of basic facts.

3. **What is the role of longer timed tests (60-100 facts)?**

   These tests are most useful for up front diagnostic assessment and for occasional general achievement testing of basic fact mastery. For example, one might give such a test about the second or third week of school to determine fact retention over the summer and to assist with instructional planning.* At the end of a semester or just after the

Christmas break this test might be readministered to determine long term retention or progress. These tests would not be given on a daily basis.

Blackline masters for longer, timed number fact tests in addition and subtraction are provided on the following pages. A 2-minute time limit for addition and a 3-minute limit for subtraction is suggested. When time is up, consider letting children use a different color pen or pencil to finish other problems they would like to do on the page.

4. **How much time should be allowed for timed tests?**

The time allowed should be a function of children's normal writing speed. These speeds vary due to differences in age and motor coordination. An individual's writing speed can be determined by counting the number of digits a child normally can write in one minute. A child who can write fifty digits per minute should be able to write answers to thirty basic facts per minute. This time allocation takes into account 2-digit versus 1-digit responses.

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* If you review a few retrieval strategies and do a little fact practice before giving the first fact test with returning students, they'll have a better chance of regaining their summer loss and come away from the test with a better attitude toward fact work for the year.

Do the Easy Ones: Addition

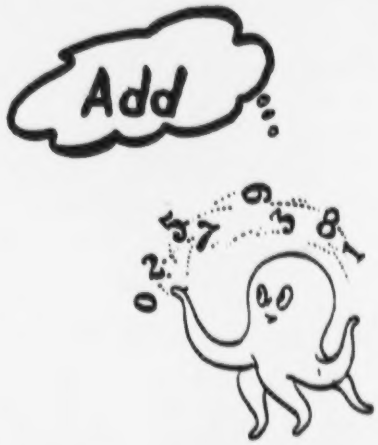
Quickly answer all those you know. It's all right to skip the hard ones.

3 + 3 = ____
8 + 1 = ____
7 + 7 = ____
4 + 8 = ____
3 + 9 = ____
2 + 3 = ____

7 + 6 = ____
2 + 5 = ____
2 + 2 = ____
4 + 4 = ____
4 + 9 = ____
4 + 3 = ____

8 + 8 = ____
3 + 4 = ____
8 + 9 = ____
4 + 7 = ____
3 + 5 = ____
4 + 0 = ____

2	4	6	5	9
+ 4	+ 5	+ 8	+ 6	+ 9
2	5	0	5	2
+ 7	+ 4	+ 6	+ 9	+ 6



1 + 5 = ____
6 + 7 = ____
2 + 8 = ____
4 + 6 = ____
3 + 6 = ____

3 + 7 = ____
3 + 8 = ____
5 + 8 = ____
5 + 5 = ____
8 + 7 = ____

6 + 6 = ____
7 + 8 = ____
6 + 5 = ____
5 + 7 = ____
7 + 9 = ____

Do the Easy Ones: Subtraction

Quickly answer all those you know. It's all right to skip the hard ones.

14 - 7 = ____
6 - 4 = ____
10 - 7 = ____
14 - 8 = ____

13 - 6 = ____
9 - 8 = ____
10 - 6 = ____
11 - 4 = ____

8 - 4 = ____
16 - 9 = ____
8 - 1 = ____
17 - 8 = ____

7 - 2 = ____
9 - 0 = ____
10 - 3 = ____
14 - 5 = ____

17 -9	6 -1	12 -4	15 -7	8 -3	11 -7	14 -9	10 -4
18 -9	7 -0	14 -6	11 -6	13 -8	8 -5		
9 -6	11 -5	15 -8	10 -8	6 -6	11 -3		
9 -7	16 -8	9 -4	12 -7	9 -3	16 -7		

8 - 6 = ____
10 - 5 = ____
7 - 3 = ____

12 - 6 = ____
11 - 8 = ____
13 - 7 = ____

12 - 5 = ____
8 - 8 = ____
12 - 8 = ____

13 - 5 = ____
9 - 5 = ____
13 - 9 = ____

5. What is the role of short "jiffy" quizzes in testing mastery of basic facts?

Evaluation is tied to teaching. Hence, a first level of assessment in the area of basic facts relates to children's mastery of each new group of facts studied (Doubles, Magic 9s, . . .). When students have had the chance to investigate cues and hints for remembering a group of facts, and have had opportunity for practice, both oral and written quizzes could be used. JIFFY QUIZZES are good for this purpose. These quizzes are:

- Short—containing only six or eight facts.
- Frequent—even daily over a period of several days.
- Limited at first only to the new facts being studied.

Cumulative review quizzes test retention over time. We recommend that JIFFY QUIZZES again be used for this purpose.

A set of Jiffy Quizzes matching the strategies developed in this resource are contained in Appendix A. This appendix contains:

- Fun Quiz (3 sheets)
- General Addition (2 sheets)
- Addition 3 through 14 *
- Subtraction 1 through 16 *

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* Keyed to strategy, with cummulative review of facts from "easier" strategies.

Suggestions for using these quizzes follow:

Fun Quiz: Distribute the appropriate quiz section for the month. Show and say a number fact, pause two seconds, then say the answer. Children try to write the correct answer before you say it. If they succeed, they complete the drawing. At the end, the total number of problems answered correctly is recorded. *Quizzes like this can create healthy attitudes and less test anxiety. Ocassionally give facts but no answers; collect and grade the papers for a "real" quiz.*

Note: Early in the year or in work with a particular group of facts, the 2-second time pause could be extended, then gradually reduced to criterion.

Generic Addition 1 and 2: Distribute the sheets, but use only one row a day, and collect for reuse. Tell children what number to write into the empty spaces ("Write a 2 in each space" (or a 3; or 2, 3, 2, 3, ... if you are studying Count Ons); "Just copy the number you see each time" (if you are studying doubles); and so on.

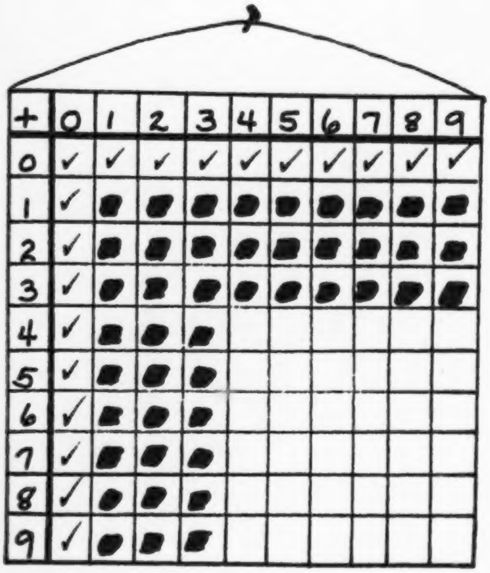
Addition 3-14 and Subtraction 1-14: The code in the upper right corner indicates which facts are being assessed. For shorter quizzes, use only one row each day, and collect for reuse. For longer 16 or 24 fact quizzes, cut on the dotted line. Each quiz sheet contains the harder facts in the strategy group identified by the code.

6. What are alternatives for tracking progress during fact learning?

It is important to keep students attuned to their progress and goals for improvement. To many children, the task of memorizing basic facts seems endless! When Jiffy Quiz scores make it apparent that most students in the class have memorized a group of facts, the recommendation is to mark these facts off the CLASS CROSS OUT CHART. It is so motivating to children for them actually to SEE the progress they are making!

Class Cross Out Chart

Hang the chart on the wall or from the chalkboard. Flip the chart to the opposite side during quiz or test sessions. Addition Count Ons and Zeros are marked off on the sample chart below.



+	0	1	2	3	4	5	6	7	8	9
0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	✓	●	●	●	●	●	●	●	●	●
2	✓	●	●	●	●	●	●	●	●	●
3	✓	●	●	●	●	●	●	●	●	●
4	✓	●	●	●						
5	✓	●	●	●						
6	✓	●	●	●						
7	✓	●	●	●						
8	✓	●	●	●						
9	✓	●	●	●						

As goals are set with children for the year, a teacher working with beginners in addition and subtraction might want to code certain facts on the Class Cross Out Chart as "challenge" facts. These are facts which children may learn beyond the required expectations.

The *average* beginner, for example, might be expected to learn all the "easy" addition or subtraction facts in a school year, but not a few harder facts like 6 + 8 or 8 + 5. In every classroom, however, there are some few capable students who will take the "challenge" and learn them all! The goal is to encourage good students without discouraging others.

Individual Cross Out Sheets

Letting children keep **individual** Cross Out sheets is another way of keeping students apprised of their progress. A blackline master for addition and for subtraction are provided on the next page. The sheet can be cut, glued onto cardstock and used by students as bookmarks in their mathematics books.

Allow very low level students to keep the Cross Out Sheets at their desks for seatwork, homework and tests (except for basic fact or standard tests). This approach will lesson their dependence on inefficient or inaccurate habits and will help them be less frustrated in their work. It will also allow teachers to see what the students CAN do, when facts are not an issue. All the while, time is gained for teaching strategies to help students master unknown facts and "catch up" with others in the class.

ADDITION CROSS OUT SHEET

+0

0 + 0 = 0
1 + 0 = 1
2 + 0 = 2
3 + 0 = 3
4 + 0 = 4
5 + 0 = 5
6 + 0 = 6
7 + 0 = 7
8 + 0 = 8
9 + 0 = 9

+1

0 + 1 = 1
1 + 1 = 2
2 + 1 = 3
3 + 1 = 4
4 + 1 = 5
5 + 1 = 6
6 + 1 = 7
7 + 1 = 8
8 + 1 = 9
9 + 1 = 10

+2

0 + 2 = 2
1 + 2 = 3
2 + 2 = 4
3 + 2 = 5
4 + 2 = 6
5 + 2 = 7
6 + 2 = 8
7 + 2 = 9
8 + 2 = 10
9 + 2 = 11

+3

0 + 3 = 3
1 + 3 = 4
2 + 3 = 5
3 + 3 = 6
4 + 3 = 7
5 + 3 = 8
6 + 3 = 9
7 + 3 = 10
8 + 3 = 11
9 + 3 = 12

+4

0 + 4 = 4
1 + 4 = 5
2 + 4 = 6
3 + 4 = 7
4 + 4 = 8
5 + 4 = 9
6 + 4 = 10
7 + 4 = 11
8 + 4 = 12
9 + 4 = 13

+5

0 + 5 = 5
1 + 5 = 6
2 + 5 = 7
3 + 5 = 8
4 + 5 = 9
5 + 5 = 10
6 + 5 = 11
7 + 5 = 12
8 + 5 = 13
9 + 5 = 14

+6

0 + 6 = 6
1 + 6 = 7
2 + 6 = 8
3 + 6 = 9
4 + 6 = 10
5 + 6 = 11
6 + 6 = 12
7 + 6 = 13
8 + 6 = 14
9 + 6 = 15

+7

0 + 7 = 7
1 + 7 = 8
2 + 7 = 9
3 + 7 = 10
4 + 7 = 11
5 + 7 = 12
6 + 7 = 13
7 + 7 = 14
8 + 7 = 15
9 + 7 = 16

+8

0 + 8 = 8
1 + 8 = 9
2 + 8 = 10
3 + 8 = 11
4 + 8 = 12
5 + 8 = 13
6 + 8 = 14
7 + 8 = 15
8 + 8 = 16
9 + 8 = 17

+9

0 + 9 = 9
1 + 9 = 10
2 + 9 = 11
3 + 9 = 12
4 + 9 = 13
5 + 9 = 14
6 + 9 = 15
7 + 9 = 16
8 + 9 = 17
9 + 9 = 18

Glue to a 4 x 6 index card.

SUBTRACTION CROSS OUT SHEET

–0

0 – 0 = 0
1 – 0 = 1
2 – 0 = 2
3 – 0 = 3
4 – 0 = 4
5 – 0 = 5
6 – 0 = 6
7 – 0 = 7
8 – 0 = 8
9 – 0 = 9

–1

1 – 1 = 0
2 – 1 = 1
3 – 1 = 2
4 – 1 = 3
5 – 1 = 4
6 – 1 = 5
7 – 1 = 6
8 – 1 = 7
9 – 1 = 8
10 – 1 = 9

–2

2 – 2 = 0
3 – 2 = 1
4 – 2 = 2
5 – 2 = 3
6 – 2 = 4
7 – 2 = 5
8 – 2 = 6
9 – 2 = 7
10 – 2 = 8
11 – 2 = 9

–3

3 – 3 = 0
4 – 3 = 1
5 – 3 = 2
6 – 3 = 3
7 – 3 = 4
8 – 3 = 5
9 – 3 = 6
10 – 3 = 7
11 – 3 = 8
12 – 3 = 9

–4

4 – 4 = 0
5 – 4 = 1
6 – 4 = 2
7 – 4 = 3
8 – 4 = 4
9 – 4 = 5
10 – 4 = 6
11 – 4 = 7
12 – 4 = 8
13 – 4 = 9

–5

5 – 5 = 0
6 – 5 = 1
7 – 5 = 2
8 – 5 = 3
9 – 5 = 4
10 – 5 = 5
11 – 5 = 6
12 – 5 = 7
13 – 5 = 8
14 – 5 = 9

–6

6 – 6 = 0
7 – 6 = 1
8 – 6 = 2
9 – 6 = 3
10 – 6 = 4
11 – 6 = 5
12 – 6 = 6
13 – 6 = 7
14 – 6 = 8
15 – 6 = 9

–7

7 – 7 = 0
8 – 7 = 1
9 – 7 = 2
10 – 7 = 3
11 – 7 = 4
12 – 7 = 5
13 – 7 = 6
14 – 7 = 7
15 – 7 = 8
16 – 7 = 9

–8

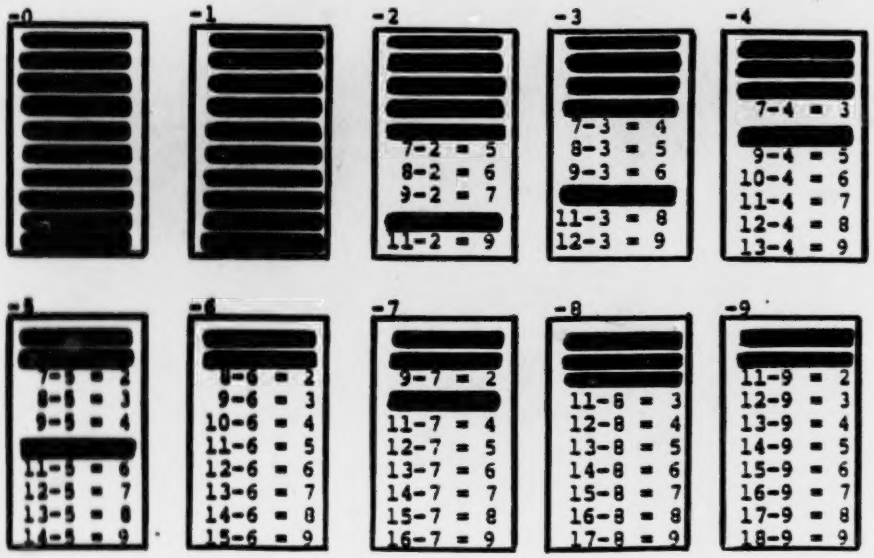
8 – 8 = 0
9 – 8 = 1
10 – 8 = 2
11 – 8 = 3
12 – 8 = 4
13 – 8 = 5
14 – 8 = 6
15 – 8 = 7
16 – 8 = 8
17 – 8 = 9

–9

9 – 9 = 0
10 – 9 = 1
11 – 9 = 2
12 – 9 = 3
13 – 9 = 4
14 – 9 = 5
15 – 9 = 6
16 – 9 = 7
17 – 9 = 8
18 – 9 = 9

After testing children individually **cross out** boldly, as in the sample below, **all those facts which a student knows well.** If a child *counts quickly* and can derive a correct answer within two seconds, cross it out. This two-second criterion for mastery typically can be met only when the fact is truly memorized or when short counts are involved. Long counts will involve a child beyond two seconds.

Subtraction Cross Out Sheet

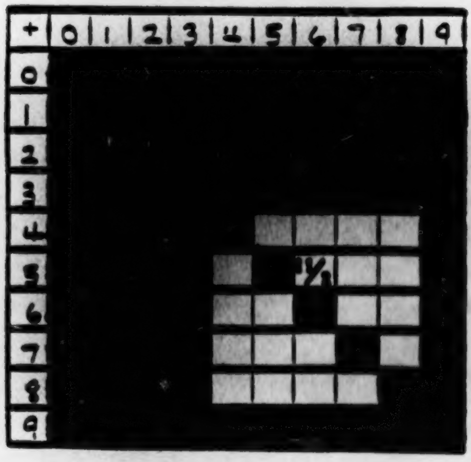

-0
-1
-2
7-2 = 5
8-2 = 6
9-2 = 7
11-2 = 9
-3
7-3 = 4
8-3 = 5
9-3 = 6
11-3 = 8
12-3 = 9
-4
7-4 = 3
9-4 = 5
10-4 = 6
11-4 = 7
12-4 = 8
13-4 = 9
-5
7-5 = 2
8-5 = 3
9-5 = 4
11-5 = 6
12-5 = 7
13-5 = 8
14-5 = 9
-6
8-6 = 2
9-6 = 3
10-6 = 4
11-6 = 5
12-6 = 6
13-6 = 7
14-6 = 8
15-6 = 9
-7
9-7 = 2
11-7 = 4
12-7 = 5
13-7 = 6
14-7 = 7
15-7 = 8
16-7 = 9
-8
11-8 = 3
12-8 = 4
13-8 = 5
14-8 = 6
15-8 = 7
16-8 = 8
17-8 = 9
-9
11-9 = 2
12-9 = 3
13-9 = 4
14-9 = 5
15-9 = 6
16-9 = 7
17-9 = 8
18-9 = 9

Keep Cross Out Sheets current. Set weekly, individual goals for students using the sheets. Select several facts for study which have a common strategy for recall. For example, "This week, use the pattern to learn 9s you don't know." Help students when you can during the week and, if possible, ask parents to help.

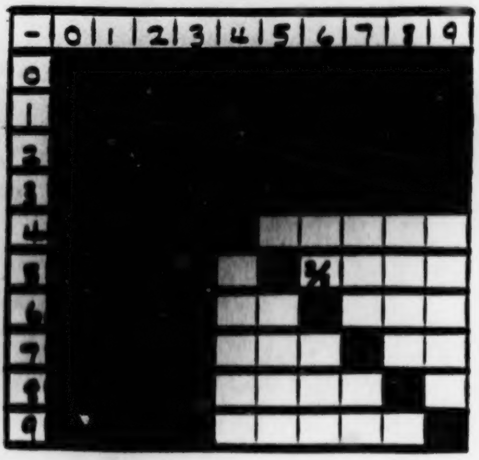
At the end of the week, give a short quiz over facts that have been set for study. Include review facts as well, to determine whether students "know" the new facts well, even when randomly mixed with others. Given that you've set reasonable goals, several facts can be learned and crossed out each week.

With some special needs students, CONSISTENCY in performance, one day to the next, is a problem. In these special cases, use a yellow high-lighter to cross out facts after a first testing. Then, if the same problems also are answered correctly at a second testing, cross them out boldly.

Teachers may find it helpful to keep their own copy of children's Cross Out Sheets. Knowing exactly which facts these students know will help the teacher emphasize these facts in class examples and in available free moments with individual children. Teachers can keep duplicates of each student sheet or use recordkeeping forms like those on the following page for this purpose. The samples below illustrate how to use these forms. Facts "known" at the time of testing are blackened. (A) indicates that the fact 5 x 6 was learned and crossed out on November 2 (11/2). According to (B), the fact 36 + 4 was crossed out on February 5 (2/5).



(A)



(B)

Alternative Recordkeeping Forms for Teachers

Mark off facts that children know.*

	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

Child's name______________

	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

Child's name_____________

	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

Child's name____________

	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

Child's name_____________

*See suggestions for use, p. 27.

Facts Students Know

After individual testing, circle sums (or differences) of facts a child knows. The number 10 circled in the "2" row means 2 + 8 (addition) or 10 - 2 (subtraction fact).

	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9	10
2	2	3	4	5	6	7	8	9	10	11
3	3	4	5	6	7	8	9	10	11	12
4	4	5	6	7	8	9	10	11	12	13
5	5	6	7	8	9	10	11	12	13	14
6	6	7	8	9	10	11	12	13	14	15
7	7	8	9	10	11	12	13	14	15	16
8	8	9	10	11	12	13	14	15	16	17
9	9	10	11	12	13	14	15	16	17	18

Child's name_______________

	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9	10
2	2	3	4	5	6	7	8	9	10	11
3	3	4	5	6	7	8	9	10	11	12
4	4	5	6	7	8	9	10	11	12	13
5	5	6	7	8	9	10	11	12	13	14
6	6	7	8	9	10	11	12	13	14	15
7	7	8	9	10	11	12	13	14	15	16
8	8	9	10	11	12	13	14	15	16	17
9	9	10	11	12	13	14	15	16	17	18

Child's name_______________

	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9	10
2	2	3	4	5	6	7	8	9	10	11
3	3	4	5	6	7	8	9	10	11	12
4	4	5	6	7	8	9	10	11	12	13
5	5	6	7	8	9	10	11	12	13	14
6	6	7	8	9	10	11	12	13	14	15
7	7	8	9	10	11	12	13	14	15	16
8	8	9	10	11	12	13	14	15	16	17
9	9	10	11	12	13	14	15	16	17	18

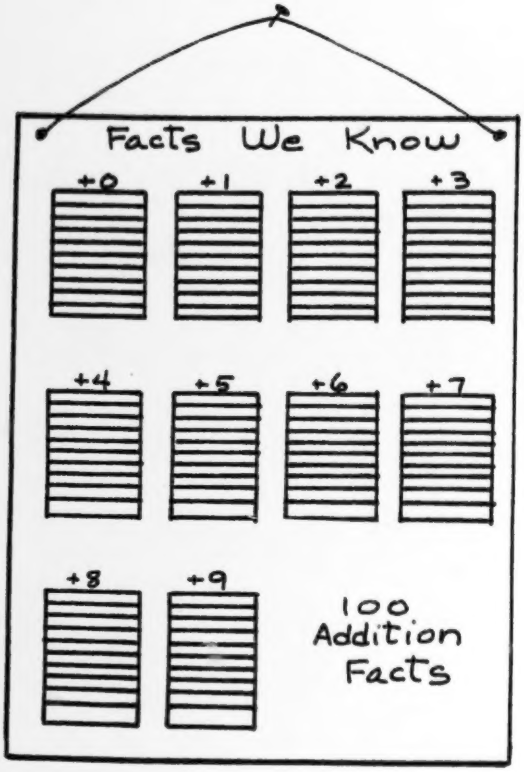
Child's name_______________

	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9	10
2	2	3	4	5	6	7	8	9	10	11
3	3	4	5	6	7	8	9	10	11	12
4	4	5	6	7	8	9	10	11	12	13
5	5	6	7	8	9	10	11	12	13	14
6	6	7	8	9	10	11	12	13	14	15
7	7	8	9	10	11	12	13	14	15	16
8	8	9	10	11	12	13	14	15	16	17
9	9	10	11	12	13	14	15	16	17	18

Child's name_______________

In a regular classroom, using individual Cross Out sheets will be manageable only with four or five students—those most in need. An alternative for other students is to have them keep a personal bar graph or record of the number of correct answers on basic fact quizzes. Some teachers follow the policy that if three perfect scores are accumulated by a student in a week, then the child does not have to sit for further basic fact quizzes that week.

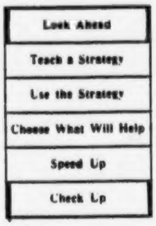
Build Up Lists



Another alternative is to help students create a class or an individual "Build Up" list like that shown. In a class setting, as students master a group of facts, they can be written onto a poster sized chart.

(Hang on a wall or from the chalk-board. Flip to the opposite side during quiz or test sessions.)

Getting Started:
Diagnostic Planning



The following guidelines may prove useful as you look ahead to plan your addition and subtraction number fact program for the year.

Check Concept Understanding

A program stressing fact memorization naturally starts with a concept check for each operation involved. Given a written number fact, can a child use objects in a meaningful way to derive answers? Or at a higher level, if the child "knows" the correct answer, can objects be used to show that an answer provided makes sense? A first basis for checking concept understanding is using objects in relation to what is written. Other suggestions for checking concept understanding are included in the Look Ahead section of this resource.

Children's understanding of a concept can grow as their experiences give them a broader basis for comparison and use. Children gain greater perspective on addition, for example, when they begin to grasp its relation to subtraction. At first children may only understand that addition causes an increase and subtraction a decrease. Later, relationships like the effect on the sum of increasing an addend by one or the inverse relation between addition and subtraction are recognized and perhaps used.

The major point is that instruction should not shift to memory work until children have had time to explore an operation in problem solving contexts through direct modeling and other informal approaches. In the meantime, emphasis on other prerequisite skills--like those identified in the Look Ahead section should be checked as a first step to diagnostic planning for basic fact mastery.

Select The Starting Point

The starting point for students studying a set of number facts for the first time will differ, of course, from that selected for returning students. Suggestions for selecting and sequencing fact groups for study at different grade levels are outlined in the Teaching Sequences for Addition and Subtraction Fact Section. This section emphasizes that, for both operations, "easy" facts should be studied before "harder" facts. The major difference between beginners and returning students is that the older students typically can do quite well with addition 9s and doubles very early in the sequence in contrast to beginners for whom work with Count Ons and Zeros might first be more appropriate. The suggested subtraction sequence and hence the starting point in subtraction is much the same for both groups of students.

Diagnostic assessment plays an important role in "getting started" at the beginning of a year's number fact program and with each new group of facts as work progresses throughout the year. After opportunity for review, it typically is useful to give students a timed test or otherwise assess which facts are known and which are difficult.

The blackline masters for "Do the Easy Ones" or flash cards may be used for whole class or individual testing of students. If a written, timed test if given, allow students to finish the test using a pen or colored pencil after time is up. This approach lessens the frustration many students feel at not being able to finish and provides important diagnostic information.

When you need to know specifically which facts can be answered correctly and quickly (within two seconds), and which are not mastered—it will be necessary to test students individually. Individual settings provide the opportunity to observe every response made by a child. The information obtained from either a written or an oral quiz is particularly useful for dealing with transfer or low level students.

Other observations can provide valuable input for program planning. In general:

- What strategies are used by children to answer unknown facts? (Do they count? Use relationships between known and unknown facts? Guess? . . .)
- Are strategies used by children accurate? Efficient?

After testing, a Class Cross Out Chart or Individual Cross Out Sheets can be used for recording purposes, diagnostic planning and tracking. These recordkeeping devices and suggestions for using them are described in the Check Up section.

Analyzing the Class Cross Out Chart or Individual Cross Out Sheets will help determine the starting point for those individuals in the ongoing program.

- Which facts do children know well?
- Which facts can children answer--but slowly?
- Which facts are clearly unknown?

When dealing with individuals, it is possible to get very specific answers to these questions. Otherwise, a general class profile derived from analyzing quiz results and verbally interacting with students will provide the needed information.

It will be necessary to organize facts children have not mastered in some systematic way for study. The Teaching Sequences section, preceding the Sample Addition Lessons, provides suggestions for selecting and sequencing groups of facts for study. In general, for both addition and subtraction, "easy" facts are studied before "hard" ones. Further, work with harder subtraction facts is delayed until students master related addition facts. This approach increases the likelihood of students using addition to answer unknown subtraction facts.

An Activity Based

Addition-Subtraction

Number Fact Program

Teaching Sequences for Addition and Subtraction Facts: Overview

Build Prerequisites

When one thinks of teaching sequences, the first thing that comes to mind is prerequisites. The Look Ahead section identified major concepts and skills that lead to success in the addition and subtraction basic fact program. The first suggestion for kindergarten and early primary level teachers is to focus on four extensions of counting in conjunction with early number work to 10 or 12:

- Counting on;
- Counting back;
- Auditory recognition of whether two or three numbers are said; and
- Visual recognition of the number of objects in a 10-frame.

Activities for building these prerequisite skills are suggested in the Time and Again Activity section. Counting is a natural process. The goal is to look ahead to assure that children have good command of counting techinques that will bring them success in the number fact program. Even for returning students, because there is a great deal of loss over the summer, it typically is necessary to review these counting skills, particularly counting back and 10-frame recognition, during the first two to three weeks of school.

Determine Addition-Subtraction Sequences

"Easy before hard." This is the key. The major recommendation when planning basic fact work for the year is to identify:

- Easy addition facts;
- Easy subtraction facts;
- Harder addition facts;
- Harder subtraction facts.

One grouping of "easy" versus "harder" facts is given in the facts grouped for Easier Learning Section.

For beginners, our teachers have tended to follow the sequence implied in the list of sample lessons: Addition Count Ons, Zeros, Doubles, 10-Frame Facts. "Magic 9s" usually are delayed until after the easy subtraction facts.

Many first grade teachers treat the "harder" addition and subtraction facts as challenge facts for capable individuals.

When teachers of returning students focus on memory work for addition facts, they often start work with "Magic 9s," followed by Doubles and other easy addition facts in early fall. Bigger numbers seem more sophisticated, and catch the enthusiasm and interest of these students. Teachers then present easy subtraction facts and, later, harder facts for both operations.

Delay Subtraction

You will note the implied suggestion in these comments to DELAY SUBTRACTION until related addition facts are learned. In order to accomplish this goal, teachers would NOT treat addition and related subtraction facts in the same or in back-to-back units of instruction.

In the long run it is better to turn to other curricular topics "in between" to allow students time to learn one group of facts well before introducing another which builds on it. How can students use addition to check or, even better, to derive answers to dubtraction facts unless *they know the addition facts well?* The suggestion is to thread number fact work slowly but systematically throughout the year, rather than providing such a heavy dose in any one period of time that fact mastery is neither reasonable nor obtained.

Watch Pacing

A suggestion coming from teachers who have used the sample lessons of this resource is to pace instruction so that, within the year, there is enough time to help students where they need it most: with the harder facts. The tendency is to spend too much time on the easy facts, to the eventual neglect of the harder facts.

Suggestions for Adapting the Adopted Text Book Series

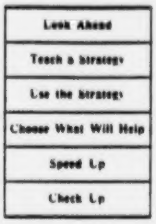
What if your school district's program or adopted textbook series does not present ideas like those presented here and in the sample lessons? In our experience, *it still is possible to take a systematic, strategy-based approach to helping children master basic addition and subtraction number facts.* The major modifications necessary will be:

- To delay subtraction until related addition facts are learned. This typically will require treating other topics or chapters before going back to subtraction work.
  The goal is to provide students the opportunity to learn addition facts to mastery. They then will be in a better position to use addition to answer unknown subtraction facts.

- To ask children just to do those problems on a page that "fit" a newly-learned strategy. For example, just do the Count Backs on this page. This is an excellent "Choose Activity!"

This approach allows teachers to use and reuse textbook pages which sequence facts differently than suggested in this resource. Teachers also may consider doing more "Add to Check" work, as in the sample subtraction lessons, before treating fact "families" such as 5 + 2 = 7, 2 + 5 = 7, 7 - 2 = 5, 7 - 5 = 2. It usually will be necessary to supplement textbook suggestions and provide more fact practice on an on-going basis.

Since many textbook publishers are now adopting a strategy approach to teaching basic facts, the ideas of this resource and particularly those in the sample lessons which follow, should prove to be a useful supplement to the school adapted program. Specific suggestions on instructional strategies for using the sample addition lessons follow.



USING THE ADDITION AND SUBTRACTION SAMPLE LESSONS

The following two sections contain sample lessons which teachers have found useful for helping children memorize addition and subtraction number facts. The reference section of this resource lists several journal reports related to the use of lesson ideas by these teachers and their students.

Each sample lesson is structured using the six aspects of the framework presented earlier in this resource:

- Look Ahead
- Teach a Strategy
- Use the Strategy
- Choose What Will Help
- Speed Up
- Check Up

For most students in every class, all six types of activities are necessary for promoting relatively quick mastery and long-term retention.

On the other hand, what about those one or more students in every class who memorize easily and don't need to be "shown how" to do so? Clearly, children who know a group of facts should not be required to "use a strategy" to derive answers! Thinking strategies suggested in the sample lessons are a means to an end. They are not ends in themselves. In our experience and for the following reasons, however, even bright students who memorize quickly have enjoyed and benefited from the approaches taken in this resource:

- Most activities are "hands on";
- Strategies often involve visual cues or mental thinking patterns which these students enjoy; and
- In the spirit that "less is best, more often," number fact work frequently occupies only *small portions* of a class period.

Perhaps the major consideration when dealing with all children, including those who learn quickly, is to be flexible and open to students' ideas while presenting thinking strategies. We suggest and encourage, in an effort to lead children using inefficient approaches to adopt quicker, more efficient methods of learning. Still, we accept alternate, correct approaches and refrain from imposing one mode of thinking on all. Every time we tune in on the way students are thinking, we learn something! Sometimes we learn they need our suggestions; sometimes we learn they are more sophisticated than we may have given them credit!

The Daily Lesson: Major Focus and Minor Focus

The overriding goal of the sample lessons is to achieve memorization, or automatic recall of the 100 addition and 100 subtraction facts. Toward this end, facts are grouped by strategy for recall, and lesson suggestions are given for teaching these recall *strategies* to children.

On those days Strategy activities are introduced, number fact work would normally be the central or MAJOR FOCUS of the math lesson. On most other days following this introduction, entire class periods typically are not needed. Basic fact work would be the MINOR FOCUS, threading the curriculum, while the major part of the period could be devoted to unrelated work: place value, money, time, geometry, measurement, fractions, or other topic.

Teaching the Lessons

Each sample lesson presents an activity sequence for learning a group of number facts. Some lessons for easy facts like Zeros may be taught, start to finish, in one period. Other lessons involving a greater number or more difficult facts may be spread out over a week or more.

The first consideration before actually teaching any lesson is to look ahead far enough to insure that prerequisite concepts and skills are intact. These prerequisities are summarized in the Speed Up Activities Section, and those which specifically apply are listed at the beginning of each sample lesson. The need to assure that children know related addition facts before beginning a subtraction lesson also is critical.

In particular, the need to develop appropriate *counting skills* before expecting children to apply them in a lesson is critical. Because teachers are aware of the difficulty most children experience *counting back,* they appreciate the suggestion to start working on this skill early in the year during the development or review of numbers to 10 or 12, well before subtraction has begun; and to continue this work on an on-going basis while addition is being studied. The need to assure that children know related addition facts before beginning a subtraction lesson also is critical.

Most Strategy and some Use and Choose activities require manipulatives. These are used at first to model and later to check the thinking pattern or approach being developed. A summary of materials needed for each lesson is given in Appendix B. Many teachers extend this list as they modify existing or insert additional activities for the sample lessons. First activities in a lesson tend to be teacher directed, with suggestions for small group or cooperative learning. With the exception of occasional checks, manipulatives related to strategy work are dropped in each lesson when the instructional thrust shifts to Speed Up work. A mix of teacher-directed and small group or independent activity is included in these practice activities.

Ideas for modifying basic activity suggestions for children with special learning needs are given in a section following the sample lessons. Suggestions given provide ideas for reaching children through their learning strengths, and offer additional insights for helping children compensate for specific learning deficits.

Many of the activities throughout each lesson call for individual chalkboards. Alternatives to using chalkboards are considered in Appendix B, and suggestions for care and storage are given. With the exception of counters and classroom materials, which most teachers have readily available, only the card sets provided in Appendix C are required for carrying out the lessons. Directions for using these cards are summarized in Appendix C and also appear, where appropriate, throughout the lessons.

The Rainy Day and Bulletin Board Activities sections, following the sample lessons, provide ideas for on-going review and practice of facts. Sample letters to parents, provided in the Home Involvement section, suggest ideas for home communication related to the number fact program. A rule of thumb regarding fact work and homework is to wait until children have nearly completed a lesson and are into Speed Up before involving parents or requiring children to study a particular group of facts at home.

The Jiffy Quizzes of Appendix A are tied to the Check Up work of each lesson. Suggestions regarding Check Up and the use of a Class Cross Out Chart on which facts are marked off as studied were given earlier in the section on Check Up. As children become comfortable with a group of facts, it is important to extend fact work to involve children in decision making, patterning, and mental math activities, as suggested in Extensions of the Basic Fact Program following the sample lessons.

Look Ahead
Teach a Strategy
Use the Strategy
Choose What Will Help
Speed Up
Check Up

Time And Again Activities

Most children benefit by repetition of certain basic activities, such as those described below. For obvious reasons, these activities are called "Time and Again" activities. They are referred to frequently in the sample addition and subtraction lessons.

Counting Activities for Beginners
Looking Ahead to Easy Addition and Subtraction Facts

The early number program has its roots in counting. Indeed, to count with skill and understanding is an important problem solving skill in mathematics. Children refine and rely heavily on their ability to count in early school tasks.

> Counting is the natural basis for solving addition and subtraction combinations in the beginning mathematics program, both within and apart from problem solving contexts.

When the concept of addition or subtraction is initially mastered by first grade students, the goal shifts to memorizing basic facts and more efficient counting schemes are desirable. An emerging thrust in school mathematics is to capitalize on the natural inclination of young children and encourage them to *count on* to solve addition problems like 4 + 2 or 3 + 8; to *count back* to answer subtraction problems 9 - 3 or 7 - 2. These number combinations involve "short counts" of one, two or three. This thrust is a good one. *But there are hidden prerequisites to success.* It is helpful to *look ahead* to emphasize the following four extensions of counting:

- counting on;
- counting back;
- auditory patterning (recognizing whether two and three numbers are counted);
- visual recognition of objects in the 10-frame.

Activities for developing skills in each of these four areas follow. The goal is to assure that useful counting skills are intact before we ask children to apply them in the early addition-subtraction program.

Starting about mid second semester in the kindergarten program, Look Ahead activities like those described below can be carried out *two to three times each week.* The emphasis at this level involves numbers to 10 or 12. This thrust is extended into the early first grade program and typically requires review at the beginning of second grade. Remedial programs treat these activities as needed.

EXTENDED COUNTING ACTIVITIES

Counting On

Many excellent sources (e.g., Boratta-Lorton, 1976; Leutzinger and Nelson, 1979; Rathmell, 1978; Richardson, 1982, Thornton and Toohey, 1984) describe activities to help children count on from a given number. Introductory activities use countable objects. Later the transition to numbers is made. The immediate goal is to provide many opportunities in which the first vocal number in a count is not "one." Start with any other number, 4-9 and count on two or three more.

Time and Again Activity 1

WEE HANDFUL Materials: 12 small counters with a lid

A child takes a "wee handful" (e.g., five counters) from the box, counts how many are taken, and places them into the lid of the box.

Hold the box lid high, so no one can peek.

"Let's put more counters into the lid. Count with me. How many in the lid? (5) Now..."

one by one three additional counters are dropped into the lid

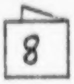
"...there's 6, 7, and 8."

If it seems helpful, allow children to recount from 1 to check. Then return all counters to the box and repeat for other wee handfuls. Each time, get children to count on aloud from the number of counters in the lid as—one by one—one, two, or three additional counters are dropped into the lid.

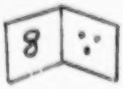
Time and Again Activity 2*

Say, Unfold and Count On! (Materials: Folded number/dot cards as shown.) Use numbers 3 - 9 and one, two or three dots on the cards.)

Show



, (unfold)



Children say: "8, ... 9, 10, 11.

*Repeat for other cards (4 - 9) and one, two or three dots.

Counting Back

Many primary level children find it difficult to count backwards, even for short counts. It is a skill deserving greater emphasis in the early number program.

This emphasis can be carried into the home. Children can count the toys in the bath, then count backwards as they take them out. In one home a child counted forward as she gave one parent "good night hugs" then counted backward as she hugged the second.

Baratta-Lorton (1976) describes many excellent activities for counting backwards. A simple

Time and Again Activity 3

- *Break Off!* (Materials: 16 unifix cubes).

Taking turns, children make a unifix cube train (e.g., a "9" train) and count backwards as one by one, they break off cubes from the train. Special emphasis for numbers 5 - 12 is on breaking off/counting back *two* or *three* .

Example: "How many cubes in this unifix train?" (9--It's all right for children to count with you to determine the total number.) "I'll break off the three white ones one at a time and give them to Alice. Count backwards with me as I do it. How many here?" (Indicate all cubes in the train: 9.) *Break off one:* "Now there's ?" (8). *Break off another:* "Now there's ?" (7) *Break off the third: 'Now there's* ?" (6). "Yes: 9—8,7,6. Six cubes still in the train."

Note: Some children can count backwards from 10 but not from 9 or 13. Starting at 16, many children omit 15 or 13 when they count backwards. Even though the direct application of counting backwards generally is restricted to numbers 12 or less in early subtraction, it is useful to start beyond 15 from time to time with first and second grade students, to develop flexibility of thinking.

Auditory Patterning (Recognizing, without finger counting, when two or three numbers have been said.)

Is it necessary for children to finger count as they count on to add or count back to subtract 1, 2 or 3? In our experience, "No." The following activities help students "recognize" these short counts and thus make finger counting unnecessary.

The activities sensitize children to the auditory pattern which accompanies the beat of two versus three claps; the hearing of two versus three numbers.

Time and Again Activity 4

- *How Many Knocks Do You Hear?* (Materials: Paper to hide your hand as you knock on the chalkboard.)

Knock one, two or three times and ask students to tell how many knocks they heard.

Note: When children become comfortable with this first activity, proceed to that which follows.

Time and Again Activity 5

- *How Many Numbers Do you Hear?* (Materials: None.)
  Say two or three numbers in sequence (forwards or backwards), and ask students to tell how many numbers they heard

Examples:	"*6, 7, 8.* " ("Three numbers.")
	"*10, 9.*" ("Two numbers.")

Note: This a *Time and Again* activity. The payoff comes later, in the addition-subtraction program. Given 5 + 3, for example, students will tend to recognize (without finger counting) when they've counted on **three** more: "5, -- *6,7,8*." Or, for problems like 11 - 2, they will tend to recognize (without finger counting) when they've counted back **two**: "11, -- *10, 9.*" The following Time and Again activities involve body movement and further reinforce the auditory patterning for two or three.

Time and Again Activity 6

- *Say and Stand* (Materials: None.)
  Sit, hands on knees. Say a number (e.g. 8). *Count on two* before you stand. Children mimic. Repeat for other numbers.

  When children become comfortable with the "two more" pattern, carry out a similar activity in which the challenge is to count back two before you stand: "8, — 7, 6."

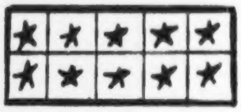
Time and Again Activity 7

- *Touch Your Toes* (Materials: None.) Stand, both hands above your head. Say a number (e.g. 9). Count on three before you touch your toes. Children mimic. Repeat for other numbers.

  When children become comfortable with the "three more" pattern, carry out a similar activity in which the challenge is to count back three before you touch your toes.

Visual Patterning Based on the 10-Frame

Good visual imagery, quickly recognizing the number of objects in a 10-frame, is a very useful skill. One example of ten things, or six or eight—is that number of objects "in the frame" (Wirtz, 1980). If students have their own individual 10-frames, one suggestion is to relate it to a picture frame and "fill" the picture *left to right* (to reinforce the left-right reading motion).



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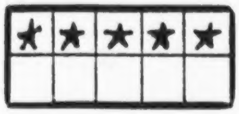
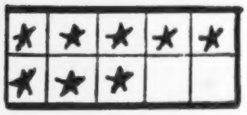
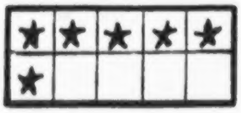


5 (top row filled)



8 (count on from 5 in top row)



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Two basic activities can be used to build visual imagery for the 10-frame:

Time and Again Activity 8

- *10-Frame Flash*. (Materials: A set of 10-frame cards [p.131].)
  Flash each card briefly, then remove it from sight. "How many stars did you see?" Repeat, emphasizing 6 - 9 stars in the frame. It often is helpful to make comments like: "Nine stars—that must be *all but one* filled. Let's check." "Seven stars—that must be the top row and two more: 5,— 6,7. Let's check."

Note: Ideally, this activity would be carried out for several weeks before turning to Activity 9, below.

Time and Again Activity 9

- *Frame Fill.* (Materials: 10-frame cards, as above.)
  Flash as above, then ask children to close their eyes. "Can you see the stars in the frame? How many would it take to fill the frame?... Let's check."

Note: Good mental imagery for the 10-frame paves the way for direct success later with 10 sums and subtracting any number from 10. It also is basic to using 10 as a bridge for adding facts like 6 + 8 and 7 + 5; and for subtracting facts like 13 - 5, 12 - 4.

Other Time and Again Activities

Visual Recognition of Finger Patterns

The following activity for "Beginners" would be used as needed, only with students who are finger counting. If they "must" use fingers, the goal is to help them use fingers in an efficient manner. If the above counting skills are developed and other strategies and sequences suggested in this book are used, children typically have no need to count on their fingers. The variation for "Older learners" is a useful preparation for the finger patterns associated with Multiplication.*

Time and Again Activity 10

- *Quick Fingers*

Beginners: Flash fingers to see if students can recognize five fingers (one hand); four (all but one finger on a hand); six (a hand and one extra finger); and other finger patterns.
Correlate with time on the hour. As you move the hour hand of a demonstration clock between the numbers 1 to 10, ask students to *use fingers* to tell time on the hour. Be sure children "use up" all fingers on one hand before showing finger from the other hand.

Older Learners: Use subtraction flash card drills to prepare for the finger pattern approach to multiplication 9s. Have students use fingers to show answers. Instruct them always to "use up" the fingers on one hand before using the other hand. For 12 - 5, for example, students would hold up five fingers on one hand, two fingers on the other.

*See Basic Number Facts-Strategies for Teaching and Learning.
Book 2: Multiplication and Division

Add to Check Activities

The following activities help build and reinforce the subtraction-addition relationship. Explicit activities like that outlined below also increase the potential of students using addition facts they know to answer unknown subtraction facts. For other activity suggestions, see pp. 94-97.

Add to Check
6
+4
10
10
-6

Time and Again Activity 11

- *Break a Stick.*

Prerequisites:

- Firm mastery of related addition facts; and, for easier subtraction use unifix cubes to model the subtraction facts
- Instruction based on the six-phase activity sequence presented earlier in this book.

Use unifix cubes to model the subtraction fact.

Example for 7-2: Make a train of 7 cubes, break off 2.
Then put the parts back together: add to check
"7-2=5 because 2+5=7."
Write the subtraction fact and its "add to check" fact.

Time and Again Activity 12

- *Write Fast!*
  Show a subtraction card. Students write the problem (with answer) and its "add to check" fact on their slates. On worksheets, students can select three favorite subtraction facts and, for each, write the "add to check" fact beside it. From time to time, ask students to use counters to illustrate the subtraction and its "add to check" fact.

Activity to Reinforce the Commutative Relationship

After one group of addition facts is introduced, the turnarounds (commutatives) of these facts also would be studied. Start with countable objects as in the addition "Turn Around!" activity found in the Count On lesson. Regularly repeat the activity which follows.

Time and Again Activity 13

- *Find Your Turnaround* (e.g. 2 + 9, 9 + 2)
  Give each student an addition basic fact card. Each child finds the person holding the turnaround card. Then students write the two facts side by side on the board for others to and complete. If a set of cards is marked (e.g. with a paper clip), children should use objects or array cards to illustrate that both have the same answer.

Activity to Reinforce the Partner Relationship

When children have learned one group of subtraction or division facts *well*, the related partner facts would be studied. Note that for subtraction Count Backs, it is suggested that this delay be prolonged. The lesson for Count Ups—the partner facts—is delayed until later.

Time and Again Activity 14

- *Find Your Partner* (e.g. 9-2, 9-7)
  Prerequisite: The Break Up Activity in the subtraction Partner Facts lesson.

  Give each student a basic fact card for addition/subtraction. Each child finds the person holding the partner card. Then students write the two facts side by side on the board for others to copy and complete. Do a quick check of work on the board, and allow students to use unifix trains or counters to check one or more matches formed.

Activities to Consolidate Known Facts (Fact Family Activities)

When students have studied both a fact and its turnaround or partner fact, then fact families can be introduced.

Time and Again Activity 15

- *Join Your Family* (e.g. 9-2, 9-7, 2+9, 9+2; 36÷9, 36÷4, 9x4, 4x9)
  a. Extend "Find Your Partner", Activity 15, above, to include all facts in a family.
  b. Give each child a fact card. Say, "I'm calling the family for 9, 2 and 7 (or 36, 9 and 4 or...)" Students holding the appropriate facts stand, read and answer their fact and, if correct, trade their card with a friend.

Activity to Reinforce Concepts

Time and Again Activity 16

- ***Use Objects to Check***
  On a regular basis, have students circle one or two facts on a worksheet and use objects or draw pictures to show their anwers make sense.

Activity to Integrate Problem Solving

Time and Again Acitivity 18

- ***What's the Story?***

On a regular basis, have students circle a fact on a worksheet, turn the sheet over and:

- draw a picture of a situation that uses numbers in the problem
- write (tell) a story using the numbers

A "Look Ahead" Activity for Mental Math

Time and Again Activity 19

- *Can You Tell Me?* (Materials: Supply of Base 10 blocks/unifix cubes; calculator (overhead model) if available.)

On a regular basis orally extend fact drills to include multiples of 10 or 100. Check one or two of the larger numbers on a calculator or with base 10 blocks?

4 + 4 = ?(8), so what's 400 + 400? 40 + 40?
2 + 2 = ?(4), so what's 200 + 200? 20 + 20?

8 - 4 = ?(4), so what's 800 - 400? 80 - 40?
6 - 3 = ?(3), so what's 600 - 300? 60 - 30?

Note: Beginners may be able mentally to work out simpler problems like those above, but have difficulty with "larger" problems like:

6 + 6 = ?(12), so 600 + 600 = 1200 and 60 + 60 = 120; or
14 - 7 = ?(7), so 1400 - 700 = 700 and 140 - 70 = 70.

Addition:

Sample Lessons

- Count Ons
- Zero Facts
- Doubles
- 10-Frame Facts
- Magic 9s
- Doubles +1
- "Make 10, Add Extra" Facts

Instructional Strategies for Helping Students Memorize Addition Facts

Seven sample addition lessons, each based on the six-step instructional framework proposed earlier in this resource are listed on the previous page. After concept work for addition has been addressed, and the goal shifts to memorizing addition number facts, then organizing these facts in ways that make it easier for children to learn them is the next big step. The sequence and ideas in the sample lessons which follow are classroom tested, and have proved very effective in helping many children.

Teachers of grade 1 beginners have found greatest success when they present the lessons in the sequence listed, beginning with Count Ons. Teachers of older primary students often prefer instead to start with addition 9s and Doubles. The sophistication of bigger numbers is more motivating to students and, when the pattern and picture suggestions given in the lessons are followed, students are quite capable of starting with these bigger addends.

The major difference in the sample lessons in comparison to more traditional programs is that facts are NOT grouped by size of the sum. Sums to 10, 12 or other number are not necessarily grouped together. Instead, facts are grouped by strategy for working them out.

"Easy" addition facts are those which involve strategies easily used by children to answer facts they do not know. They involve short counts, and making use of pictures mnemonics or patterns. Easy facts include the 45 Count Ons, the 19 Zeros, 6 Doubles, 4 other 10-frame facts, and 10 pattern 9s—all listed on p. 11. The "sums to" language does not appear in the title of any of the sample lessons.

As was mentioned in the overview of the addition-subtraction sequence, the following sequence typically is preferred:

- easy addition facts;
- easy subtraction facts;
- harder addition facts; then
- harder subtraction facts.

As this sequence might suggest, the seven lessons usually are not taught as one unit. Harder facts are delayed.

In grade 1 the addition 9s usually are not taught until spring and, except for more capable students, the 8 harder facts and their turnarounds (Doubles + 1 and "Make 10, add extra" facts) usually are not taught at all. The major focus instead is mastering the easy subtraction facts. In other grades as well, a review of the easy subtraction facts usually breaks up the addition work. In these grades it is to the child's advantage to master all 100 addition facts as early in the year as is possible.

Count Ons

Verbal Prompt: "See a 1, 2, 3 in addition? Start big and count on."

There are 45 Count Ons: The +1 Count Ons: 1+1, 2+1, 3+1,... 9+1;
the +2 Count Ons: 1+2, 2+2, 3+2,... 9+2;
the +3 Count Ons: 1+3, 2+3, 3+3,... 9+3;

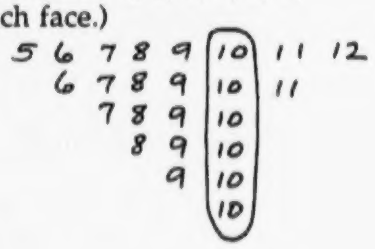
Look Ahead **Count On activities:**

- *Draw More.* (Materials: Classroom chalkboard.) Draw three small circles on the board. "How many circles do you see?" (3) *Cover the first group of three:* "Keep counting as I draw more circles -- 4, 5, 6." Erase and repeat. Each time, draw several circles; count them; then cover, and get children to **count on** as the teacher draws two or three more.

- *Wee Handful.* (Time and Again Activity 1)

- *Say, Unfold and Count On!* (Time and Again Activity 2)

- *Six of a Kind.* (Materials: Number cube labeled 4, 5, 6, 7, 8, 9; cube with one, two or three **dots** on each face.) This is an independent activity for two or three students. In turn, students roll the cubes; say the number; count on one, two or three and record the total. The first to get six of the same number loops them and wins the round.



- *Circle Count.* (Materials: Number card (4-9) for each child.) Sit in a circle on the floor; mix the cards and give one to each child. Point to a child, who says the number on the card. Children to the left of this child continue the count.

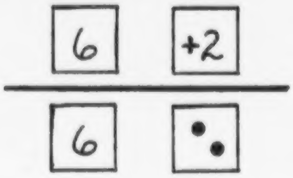
Auditory patterning activities:

- * *How Many Claps Do You Hear?* (Time and Again Activity 4)
- * *How Many Numbers Do You Hear?* (Time and Again Activity 5)
- * *Say and Stand.* (Time and Again Activity 6)
- * *Touch Your Toes.* (Time and Again Activity 7)

Sample Teaching Sequence

Teach a Strategy * *How many now?* [Materials: 9 unifix cubes (any color), 3 additional cubes (different color)]. Make a train of 5 cubes. "Five here. Count on with the teacher as she adds more cubes to the train." Attach three extra cubes, one at a time, as children count: "5,... 6, 7, 8. Ask the children to write the addition fact to match (5 + 3 = 8). Repeat for other Count Ons.

- *Draw and Say.* (Materials: Classroom chalkboard; +2 card as shown (+2; on front, 2 dots on the back); similar cards for +1 and +3.) Write a number (2-9) on the board and hold a card (+1, +2, or +3) beside it. After children say the greater number, flip the card as they continue the count. For example, "6 - 7, 8." (Repeat for other numbers.)



Note: If the teacher is working with developmentally slow or learning disabled students, it may be helpful to focus just on the +2 count ons before including the +1 or +3 facts.

Use the Strategy

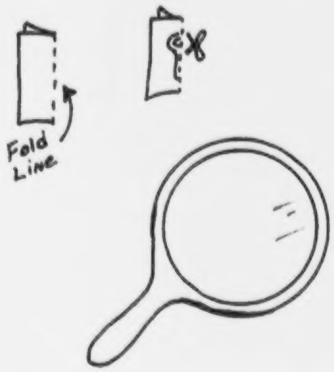
* *After Me.* (Materials: Flash cards for Count Ons.) As the teacher shows each card, the students say the greater number. Continue the count and say the sum. Then switch roles. The teacher says the greater number and the students count on and say the sum.

(This is a very important activity in which the teacher models the counting on.)

Choose

* *I Spy!* (Materials: Flash cards for Count Ons; heavy paper for spy glasses.) Help students make a monocle or magnifying glass out of heavy paper. Students look through their glasses whenever they SPY a Count On among cards the teacher presents in a flash card drill.

Each time, call on one child to count on aloud to the sum. If necessary, count on with the child.

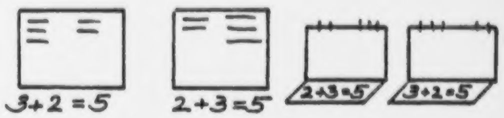


Turnarounds

Verbal Prompt: "When you know one, you really know two."

Teach a Strategy

* *Turn Around!* (Materials: Lego board or clothespin card, as shown.) Turn a lego board on a card with clothespins on a card to illustrate that, in addition, turnarounds (commutatives) have the same answer. Children write what they see before and after the teacher turns the board (card), and compare with a partner. Repeat with other numbers to help children generalize that, in addition, turnarounds have the same answer.



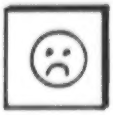
Use the Strategy

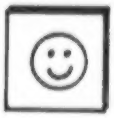
* *Like You Best!* (Materials: Workpage of addition facts.) On any math fact worksheet the teacher may assign, have students circle three "favorite" facts. Instruct them to do these first and to write the turnaround of each beside it.

As the teacher walks about the room, ask students individually to use counters the teacher provides to show that, in addition, turnarounds have the same answer. One of the three circled problems can be used to illustrate.

Choose

* *Turnaround Math.* (Materials: Flash cards for Count Ons, Happy and Sad Face Cards for each child.) Place five or six Count Ons along the chalk ledge. Then, as the teacher flashs other Count On facts, children hold up a sad face if the fact is NOT the turnaround of one on the chalk tray; and hold up the happy face if it IS. Call on a student to identify and answer each turnaround match.





Choose

* *Find It, Chalk It!* (Materials: Flash cards for any of the 45 Count Ons mixed with other; individual chalkboards.) Children write and show answers just to Count Ons they see. Students can draw a tally box on their boards and give themselves a tally for each correct answer.

* *Worksheets:* Have students find and write answers just to the Count Ons they find. If 9+3, 2+9, 8+3 or some other Count On is not on a page, write it on the board so students can copy and complete it in the margins of the page.

Speed Up

* *10 or More.* (Materials: Flash cards for Count Ons.) As the teacher flashs the cards, have children hold thumbs up if the answer is 10 or more, otherwise hold thumbs down. *Each time, call on one student to give the answer:* "Yes, thumbs up because the answer is ..."

* *Safari.* (Materials: Safari board and chance cards, found in Appendix C; set of Count On cards; game markers.) This is a game for 2-3 children. Follow directions in Appendix C.

Check Up

Jiffy Quiz
Addition 1, 2 or 3
p. 201, 202, 203

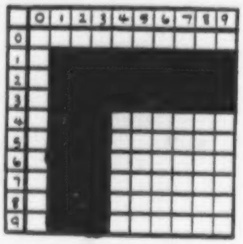
FOCUS ON the following facts and their turnarounds:

The +1 Count Ons: 1+1, 2+1, 3+1, ... 9+1;

the +2 Count Ons: 1+2, 2+2, 3+2, ... 9+2;

the +3 Count Ons: 1+3, 2+3, 3+3, ... 9+3

—and other facts previously studied.



When most students have mastered the Count Ons, cross them off the Class Cross Out list.

When at night you cannot sleep, "Count on" instead of sheep!
... Sharon Thornton

Zero Facts

Verbal Prompt: "A zero in the problem makes no change."

Look Ahead

There are 19 Zero facts: 0 + (0,1,2,3,4,5,6,7,8,9) and their turnarounds. These facts tend to be very easy for children. A firm mastery of the addition concept and related number work are adequate prerequisites. The concept of addition is reinforced in the following activities.

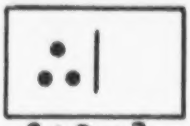
Sample Teaching Sequence

Teach a Strategy

* *On and Off*. (Materials: 10 small counters for each child.) Have students place their math books to one side on top of their desks. Set a few counters on top of each child's book and a few more off to the side on the desk. Ask the students to tell how many counters are on the books; how many are off the books, and how many there are in all. Get students to *write* the matching fact. Remind students by frequently placing no counters on (or off) a book that "+0 makes no change."

Use the Strategy

* *Red Light*. (Materials: Flash cards for Zero Facts; red construction paper circle; paper and pencil for students.) Appoint one child "traffic officer," to hold the red traffic signal light. This child will interrupt the flash card drill after two to four cards are flashed by holding up the red light and saying, "Stop!" Then all draw a dot picture to validate the last answer given . . . Appoint a new traffic officer and continue as above.



3 + 0 = 3

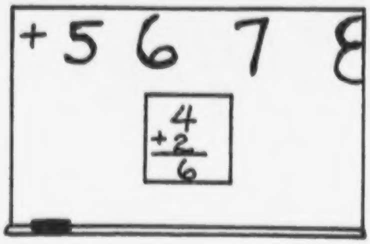
Choose

* *Snap!* (Materials for every 7-8 students: 10 small counters and a deck of Zero and Count On cards in a paper sack.) Arrange each group of 7-8 children in a circle and let them begin to pass one bag. Snap at random to stop the pass. At the snap, each child holding a bag draws a card and gives the answer. If it is a Zero fact, the student points to someone in the group who then uses counters to show that the answer given is correct.

* *Show It!* After students complete all Count Ons and Zeros on worksheets, have them circle and use counters for one or two Zero problems to verify the answers they have written.

Speed Up

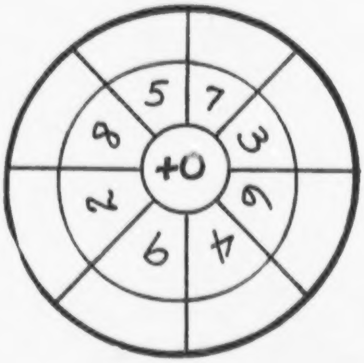
* *Match and Write.* (Materials: Classroom chalkboard; flash cards for Count Ons and Zeros.) Write the numbers 0-12 on the chalkboard. As children enter the room (after lunch, recess...), they take the flash card the teacher gives them, write it on the board near its answer, and return it to the flash card box on the teachers desk. Then, at their seats, they copy problems from the board (with answers) until the teacher signals stop and collects papers.



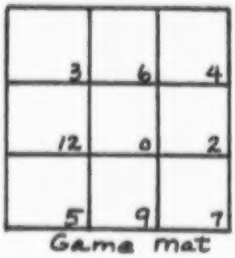
* *Telephone Sums.* (Materials: For each pair of students—a page from an old telephone book; lined or square centimeter paper, pencils and a number cube or spinner labeled 1, 3, 0, 2, 3, 0.) Let children pair up. One child selects a telephone number from the page which each copies. The other student rolls the cube/spins the spinner and both children race to add this number (e.g. 0) to each telephone digit as shown. The child who finishes the round first (with correct answers) earns one tally point. Play until teacher calls time.

+	4	5	2	8	6	3	8
0							

* *Hot Wheels.* (Materials: For each student, a laminated number wheel like that shown; crayon and wipe off rag.) Write +0 (or +1 or +2 or +3) on the board for children to copy into the center of their wheel. Then, at "Go!" they race to finish before the teacher rings a bell/flick the lights. Grade the wheels together. Have students clean their wheel and pass it to another student (e.g., the person behind them; to their left . . .). Play again with a new wheel.



- *Three in a Row.* (Materials: Flash cards for Count Ons and Zeros; individual chalkboards.) To start, children write a number (0-12) in the lower corner of each square. These numbers are answers to flash cards used in the activity. As the cards are flashed, children copy problems in the appropriate answer squares. If a square already has a fact in it, another is not written. The first child to get three in down, across, or on a diagonal calls, "THREE IN A ROW!" The child rereads each problem and its answer while the other checks. If correct, a tally point is earned. Children draw another game mat and play resumes. See who wins the most points before time to stop.

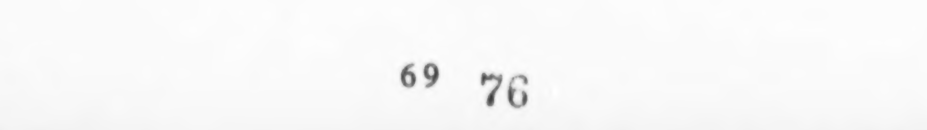


Game mat

- *Try to Beat!* (See directions in the Home Involvement section.)

- *Race Row.* (Materials: A ditto, like that shown in the Home Involvement section, in which just one addend is given.) Distribute the papers and say, "The race row for today is Row 3. Write in these numbers: 0, 0, 2, 0, 1, 3, 0... Now, GO!" Students write the given number into each problem and race to finish the row. Some teachers like to let students race against the clock rather than against each other. Allow no more than 3-4 seconds per problem and call time at the end. Grade the problems together and let students put a star or sticker beside each row which was correctly completed before the teacher calls time.

Note: As children become familiar with the activity, lower the time to 2-3 seconds per problem.



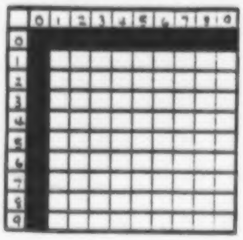
Check Up

Jiffy Quiz
Addition 1, 2 or 4
p. 201, 202, 204

FOCUS ON the following facts and their turnarounds:

0 + (0,1,2,3,4,5,6,7,8,9),

—and other facts previously studied.



When mastery is demonstrated by most students, mark Zero Facts off the Class Cross Out list.

Doubles

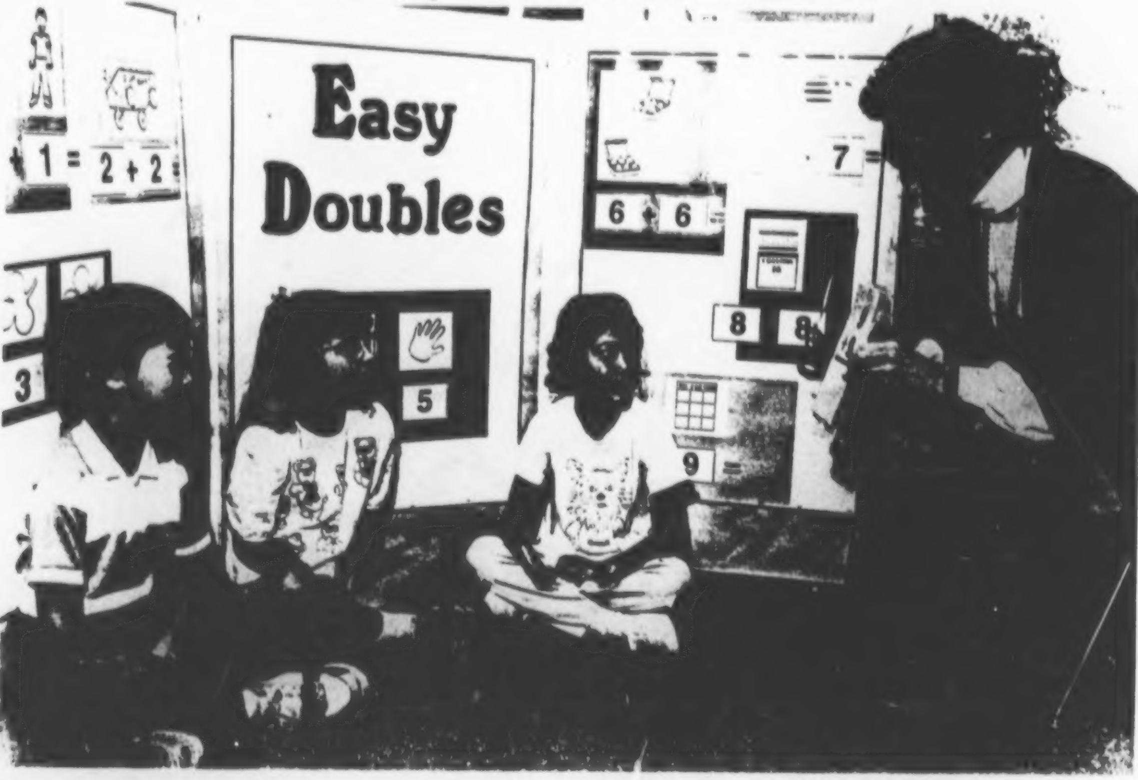
Verbal prompt: "A Double? No trouble. Think of the picture."

There are 6 Doubles to be emphasized: 4+4, 5+5, 6+6, 7+7, 8+8, 9+9.
The Picture Cards for Doubles and the "Super Star" Addition Cards picture these facts.

Look Ahead These facts tend to be very easy for children. A firm mastery of the addition concept and related number work are adequate prerequisites sites. The concept of addition is reinforced in the work with pictures.

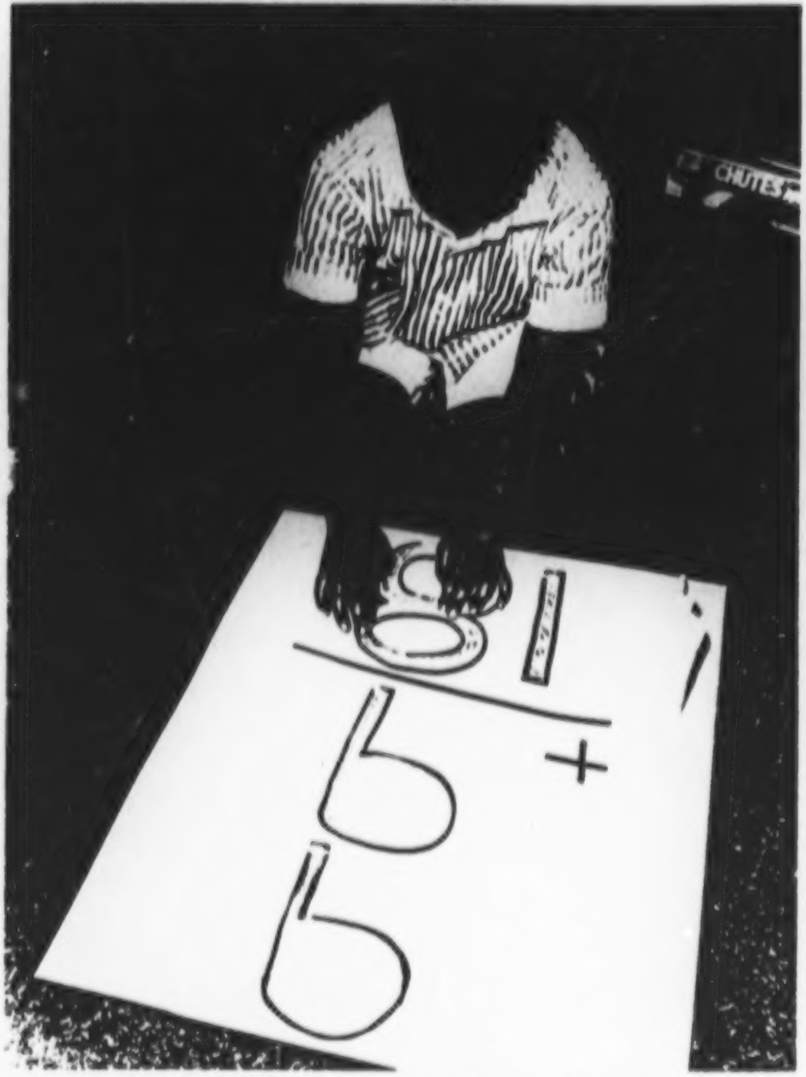
Teach a Strategy * *Picture Doubles.* (Materials: Picture Cards for Doubles.) For young beginners, introduce no more than three doubles a day. Mix "easy" with "harder" doubles, rather than presenting them in sequence. Name each fact by its picture:

- 4 + 4 (the spider fact): 4 legs on each side, 8 in all.
- 5 + 5 (the fingers fact): 5 on each hand, 10 in all.
- 6 + 6 (the egg carton/dozen fact): 6 in each half, 12 in all.
- 7 + 7 (the 2-week fact): 7 in each week, 14 in all. *(Select a calendar page having the first day of the month on a Sunday.)*
- 8 + 8 (the crayon fact): 8 in each row, 16 in all.

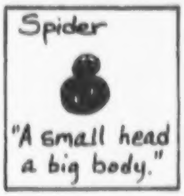


Note: The teacher could keep a box of 16 crayons to show. Some school districts put a box of 16 crayons on the beginning of the year materials list for grades 1 and 2.

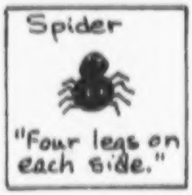
- 9 + 9 (the "double 9" domino fact): 9 on each part, 18 in all. *(OR, note that there is a loop in each "9," or TWO LOOPS in 9+9)*



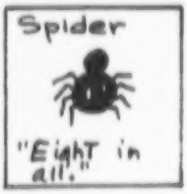
If possible, before presenting the pictures, use real objects to introduce the picture and link to the written fact. Examine a plastic spider, for example, and get children to note there are 4 legs on each side, 8 in all. Let them draw or make their own spider. Provide opportunities for children to match both ways: picture ⟷ written fact.



"A small head a big body."



"Four legs on each side."



"Eight in all."

Finger trace the digit 8 (spider body).

Use the Strategy

- *Scramble.* (Materials: For each group of 8 students, one set of Picture Cards for Doubles.). Cut the cards in half and give a Doubles fact to each child. Students sit in a circle on the floor around the Doubles pictures, which are placed face down. At the teachers signal, children scramble to find the picture for the fact assigned to them. When all pictures are found, students take turns showing the picture-Doubles fact match and answering the fact. Fact cards can be traded and pictures mixed for another round.

- *You Draw.* (Materials: Paper, crayons, scissors, glue.) Let children decorate their own Doubles cards to take home. On each, the Doubles fact should be written beneath the picture for that double.

- *Super Star!* (Materials: Deck of small Doubles Cards: facts and their related pictures.). Children play variations of any of three familiar card games.

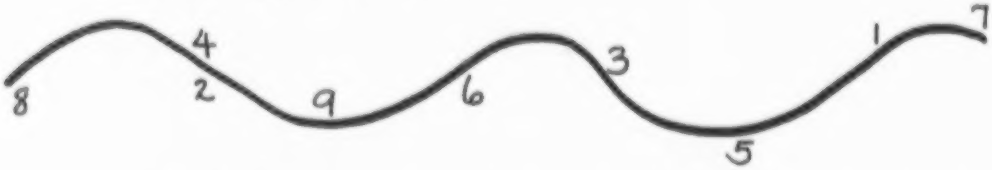
(1) SUPER STAR using Old Maid card rules (substitute the SUPER STAR card for the Old Maid).
(2) Concentration, using familiar card game rules (omit the SUPER STAR card). Make "matches": a double to its related picture and say the answer or a Doubles number fact to its answer.
(3) Fish, making books of three cards: the Doubles fact, its answer and its picture.

Choose

- *Hands Up!* (Materials: Flash cards for Doubles and other review facts.) As cards are flashed, children keep both hands on their desks until a Double is flashed, when they hold both hands up in the air. Call on one child to answer the Doubles fact and describe the picture. Example for 6+6: "That's 12 - the egg carton fact."

Speed Up

- *Double It!* (Materials: Individual chalkboards or paper and pencil). Let students work in pairs. Have them copy the following from the board:



Then let them take turns doubling each number and saying its sum. Play short, one-minute rounds. Players can keep tally of the number of Doubles sums they give in the time allowed. Variation: Taking turns, players randomly point to numbers to be doubled by the other player.

Note: The above work would be extended to include other Doubles facts: 0+0, 1+1, 2+2, 3+3.

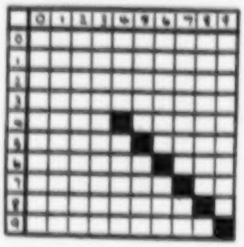
Check Up

Jiffy Quiz
Addition 1, 2 or 5
p. 201, 202, 205

FOCUS ON the following facts:

4+4, 5+5, 6+6, 7+7, 8+8, 9+9.

—and other facts previously studied.



When mastery is demonstrated by most students, mark Doubles off the Class Cross Out list.

10–Frame Facts

Verbal Prompt: "Think of the 10-frame."

There are 4 new facts to be emphasized: 6+4, 4+6, 4+5 and 5+4. In preparation for harder addition and subtraction facts, also treat, in the frame: 5+5, 1+9, 2+8, 3+7 and their turnarounds.

Look Ahead

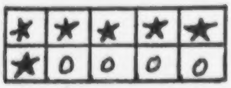
Activities to promote visual imagery for the 10-Frame:

- *10-Frame Flash.* (Time and Again Activity 8)
- *Frame Fill.* (Time and Again Activity 9)

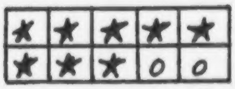
Sample Teaching Sequence

Teach a Strategy

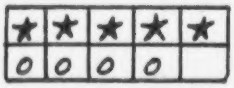
- *In the Frame.* (Materials: Individual 10-Frames and 18 counters, 9 each of two different colors, for each pair of students.) Write a 10-Frame fact (e.g. 6+4) on the chalkboard. Let students work in pairs. One child copies the fact; the other uses counters in the frame to illustrate the sum—which then is recorded.



6+4 or 4+6



8+2 or 2+8



5+4 or 4+5

Encourage children to fill the frame left to right, largest addend first. Be sure they note that, for 5+4 or 4+5, "all but one" in the frame is filled.

Use the Strategy

* *Do and Check.* (Materials: Individual 10-Frames and 18 counters, 9 each of two different colors.) Have children write answers to 10-Frame facts, then use counters in a 10-Frame to check.

Choose

* *Thumbs Up!* (Materials: Flash cards for 10-Frame and other known facts.) As the teacher flashs the cards, children should hold thumbs up for 10-Frame facts: otherwise hold thumbs down. Call on a child to answer each "thumbs up" fact. Provide feedback like: "Yes, 6 and 4 more fills the 10-Frame; 6+4=10." OR "5+4—that's all but one in the 10-Frame. 5+4=9." Try to let 5+4, 4+5, 6+4 and 4+6 appear more frequently than other facts in the deck.

Speed Up

* *Pop Up!* (Materials: Flash cards (for teacher); enough cards, numbered 5 to 12, to give one to each child. If possible, have at least two cards for each number. It is good to have even more cards for "10" and for other larger numbers, especially 9-12.) As the teacher flashs and reads each fact card, students holding the correct answer "pops up" (stands). At the teachers signal they trade cards with a classmate (before the teacher counts to 5).

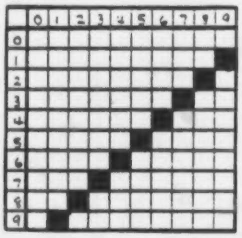
Check Up

FOCUS ON the following facts and their turnarounds:

Jiffy Quiz
Addition 1, 2 or 6
p. 201, 202, 206

6+4, 4+6, 4+5, 5+4,

—and other facts previously studied.



When mastery is demonstrated by most students, mark 10-Frame facts off the Class Cross Out list.

Magic 9s

Verbal Prompt: "See a 9? Think "What pattern will help?"

There are 10 Magic 9s to be emphasized: 9 + (4, 5, 6, 7, 8) and their turnarounds.

Look Ahead *For beginners,* check for firm mastery of addition Count Ons, Zeros, Doubles, Eash 10-Frame facts—and related subtraction facts.

Note: When prerequisites are in place and addition 9s are taught as suggested below, most students can recognize and use a pattern effectively for learning them. Should beginners persist in counting or seem unable to use a pattern for +9s, provide alternate assignments. There is no need to introduce finger counting. In another year these children will be more mature and developmentally more "ready" to use a number pattern for learning +9s.

Grade 2 level students and beyond: +9s may be treated among the first addition facts studied in the school year. The challenge of recognizing and using the pattern frequently sparks renewed interest in learning the facts.

Teach a Strategy * *Magic 9s.* (Materials: Calculator [overhead calculator, if available]; individual 10-frames ; small counters.) Write three "Magic 9s" facts on the board: (e.g. 9+6, 4+9, 9+7). For each, have one student use a calculator to find the sum. All others should check using counters or 10-frames. Record answers on the board. When complete, study all three facts. "Is there a pattern to what the numbers do?" Many children will recognize that: (1) each answer begins with 1 ten; and (2) the one's digit in each sum is one less than the number being added to 9.

Though the pattern above is used most often by children and adults alike, the teacher may be familiar with other number patterns for +9s. The teacher should select the pattern she feels will be easiest for her to teach and for her children to learn. Make no attempt to present, more than one pattern—unless the teacher feels that for an individual child, an alternate approach would be easier. Because the teacher can use a "trick" to get answers quick, many students call the facts of this lesson "Magic 9s.

Use the Strategy

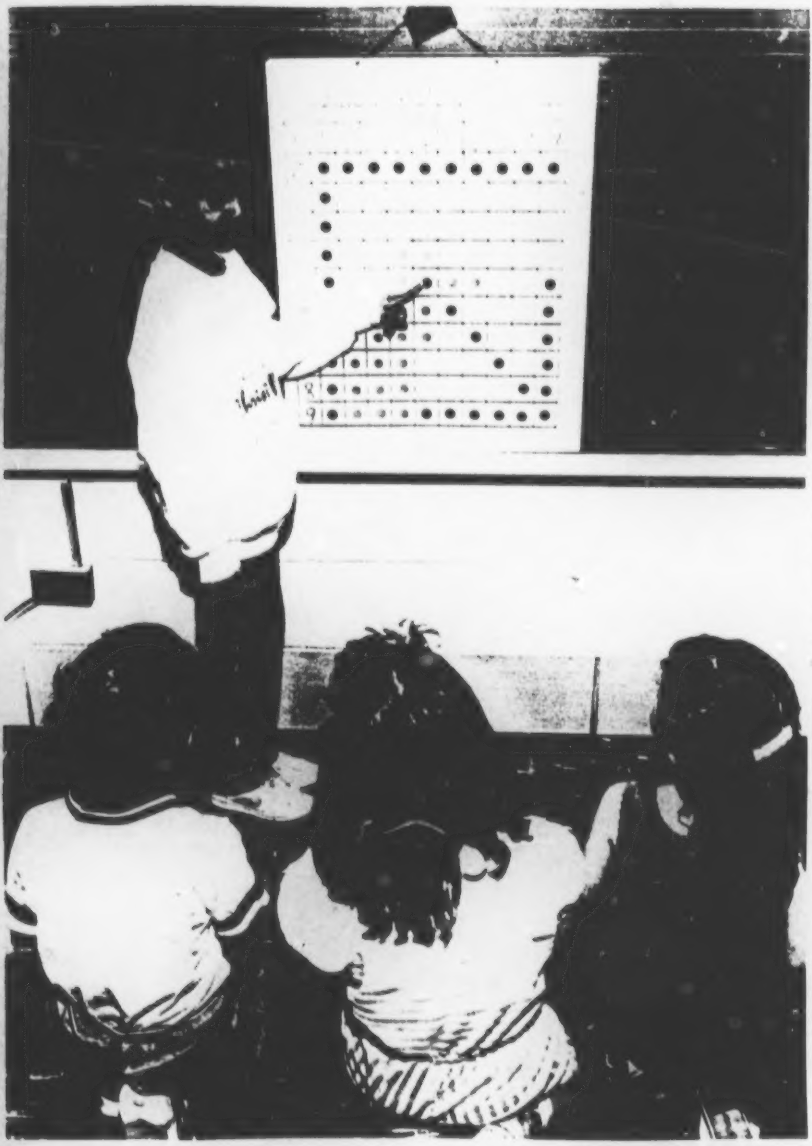
* *Beat the Calculator!* (Materials: Calculator, individual chalk-boards; flash cards for Magic 9s.) As the teacher flashs each card, students try to write and show the Magic 9 answer before a student on the calculator says the answer. Frequently call on a student to tell the "trick" for getting the answer so fast. (Providing opportunity for this last step is important. Many students need to verbalize an idea in order to make better sense of and retain it. From time to time, let students use counters to check that correct answers are given when the pattern or "trick" is used.)

Magic 9's
3 +9 12
9 +6 15
8 +9 17

* *"Hot" Number.* (Materials: Small note paper.) After students write one Magic 9 on their paper say, "The *hot* number is 13." Students holding 9+4 or 4+9 stand, show it to the teacher, then quickly trade facts with someone who is seated. As the teacher continues for other 9s, occasionally call on a student to tell the pattern or "trick" for Magic 9s.

Choose

* *Rabbit in the Hat* (Materials: Flash cards—9s and other known facts, pupil makes a rabbit small enough to be placed in the palm of their hand.) As the teacher flashs the cards the rabbit stays hidden in the hat (hand), students pull the rabbit out of the hat (hand) and answer just the Magic 9s pattern or "trick".



When mastery is demonstrated by most students, mark Magic 9s off the Class Cross Out list.

Speed Up

* *Pass!* (Materials: Small note paper; flash cards for 9s and other known facts having answers 11-17.) Children "Number off", 11-17, and write their number on paper. Then, as the teacher shows a flash card, all students with the answer stand, show the teacher their number, and quickly trade cards with someone who is seated.

* *Safari.* (Materials: Safari board and chance cards, see Appendix C, set of fact cards for Magic 9s and other review facts; game markers.) This is a game for 2 to 3 children. Follow directions which are found in Appendix C.

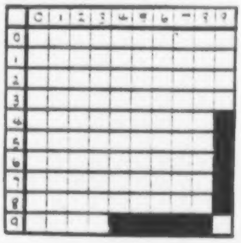
Check Up

Jiffy Quiz
Addition 1, 2 or 7-10
p. 193, 194, 196-202

FOCUS ON the following facts and their turnarounds:

9 + (4,5,6,7,8)

—and other facts previously studied.



Doubles + 1

Verbal Prompt: "When numbers are next door neighbors, think Doubles to help."

There are 6 Doubles + 1 facts: 5+6, 6+7, 7+8, and their turnarounds.

Look Ahead Firm mastery of related doubles is necessary.

Teach a Strategy (**Materials** for the following three activities: Doubles cards and Doubles + 1.. Cut each card so there is a set of picture cards and a set of number fact cards.)

* *Match to the Double.* Display the Doubles facts aside their pictures along a chalk ledge or on a bulletin board. Distribute the **Doubles +1 pictures** and ask students to **place each by its "helper" Double.** Discuss how each pair of Doubles—Doubles +1 pictures is alike; is different. For example, "Both pictures have eggs—but this one has one more egg." Get children to write the Doubles +1 fact beside its picture, and to count on from the easy Double to answer it: "6+6=12, so 6+7=1 more (13).

* *Find the Helper*. Tape each **Double +1 fact** and its picture back to back. Then distribute these to students, fact side up, and ask them to **place each by the "helper" Double..** When checking, encourage students themselves to say (for example):

"6 + 6 = 12, so 6 + 7 is 1 more (13)."

* *Fact Match*. As in *Find the Helper*, but this time hide the Doubles pictures under the **Doubles** number fact on the chalk ledge, so that students are required to **match written facts--a Double +1 to a Double,** and tell the answer for both.

Use the Strategy

* *What Helps?* (Materials: Individual chalkboards, flash cards for Doubles +1 facts.) When each card is flashed, children write and show the related Doubles fact on their chalkboards. Each time, call on one child to read and answer the Double written, then follow through by calling on a different child to complete the Doubles +1 fact.

Example: Child 1: "5+5=10."
Teacher: "So 5+6=1 more. 5+6 =?"
Child 2: "11."

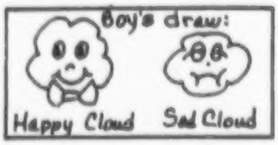
Emphasize that Doubles +1 facts are "one different" (are number neighbors). Double the little number and add one.

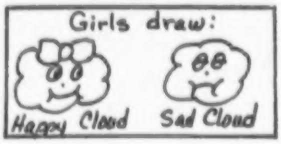
Note: Accept the thinking of the child which related 5+6 correctly to 6+6, "6+6=12, so 5+6=1 less (11)."

* *Super Star*. (Materials: Deck of Super Star cards for Doubles and Doubles +1 facts) Children play variations of any of three familiar card games: (1) Super Star using Old Main rules (substitute the SUPER STAR card for Old Maid). (2) Concentration, using the familiar card game rules. Make matches: a Double +1 number fact to its picture or a Doubles +1 number fact to its related Doubles fact. Each time, children give the answer as they indentify the match. (3) Fish, making books of four cards, the Doubles +1 and Doubles facts with the answers or pictures.

Choose

* *One Different.* (Materials: Flash cards: Doubles +1 mixed with other known facts; pupil-drawn Happy Cloud, Sad Cloud cards.) Remind students that Double +1 addends are just "one different" from (are neighbors of) each other. Flash the cards and ask students to hold up the Happy Cloud for "one different"/ Doubles +1 facts, otherwise hold up the Sad Cloud. "Good! Happy Cloud likes 6+7! The helper Double is ..." (6+6) "and that's ?" (12) "So 6+7 = ?" (13).





Speed Up

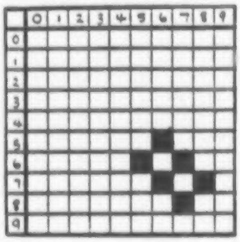
* *Five Up.* (Materials: Flash cards for Doubles +1 and other known facts.) Start a whole class drill with flash cards for five easy facts. After a round or two, replace an easy fact with a Double +1. Continue, making sure the Double + 1 "comes up" more frequently than others. As students become more confident of this Double +1, replace a second easy fact with a different Double +1, and continue.

Check Up

FOCUS ON the following facts and their turnarounds:

5+6, 6+7, 7+8,

—and other facts previously studied.



Jiffy Quiz
Addition 1, 2 or 11
p. 201, 202, 211

· **When mastery is demonstrated by most students, mark Doubles +1 facts off the Class Cross Out list.**

"Make 10, Add Extra" Facts

Verbal Prompt: "Make 10, add extra."

There are 10 "Make 10, Add Extra" facts: 7+4, 7+5, 8+4, 8+5, 8+6 and their turnarounds.

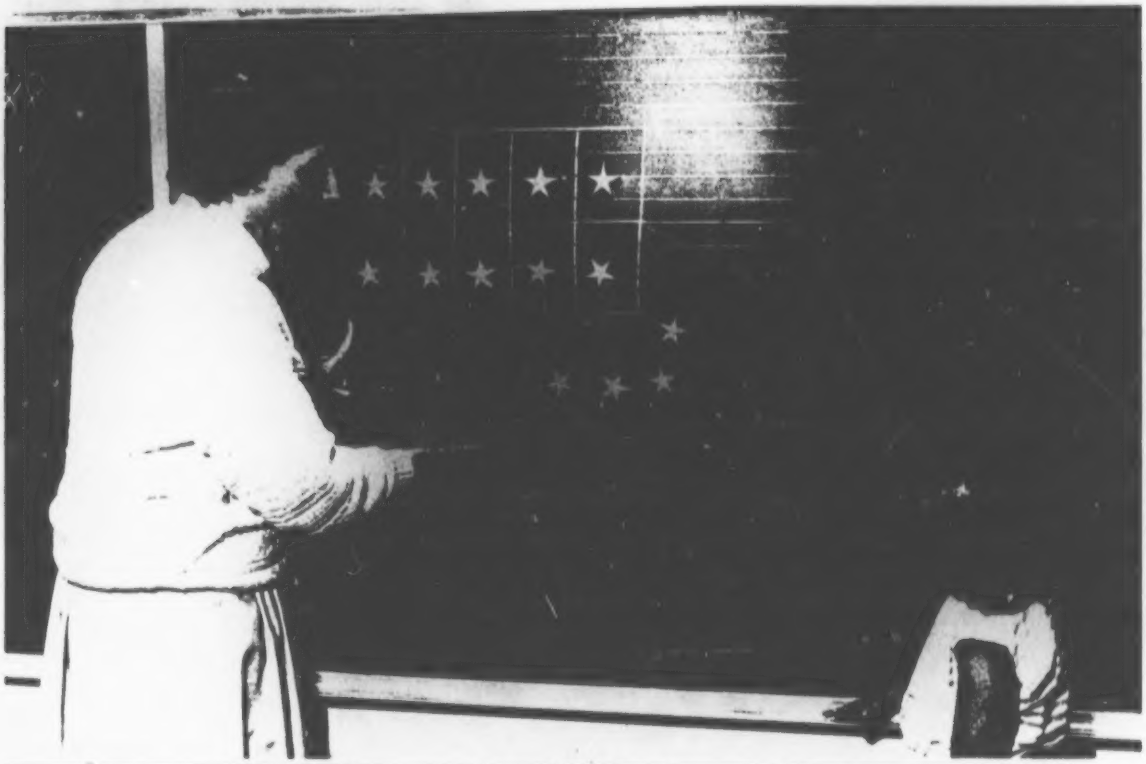
Look Ahead Children should:

1. Have strong visual imagery for the 10-frame. See:
   - *10-Frame Flash.* (Time and Again Activity 8)
   - *Frame Fill.* (Time and Again Activity 9).
2. Have firm mastery of 10 sums.
3. Mentally be able to add 10 to a 1-digit number.
   Examples: 10+4, 10+6...

Note: The strategy of this lesson is one that children can use to answer all the remaining facts. Some children, however, prefer to use the Magic 9s which they know to help them answer unknown +8 facts. ("9+4 = 13, so 8+4= 1 less (12).") Accept alternate strategies like this which are efficient and appropriate.

Teach a Strategy * *Make 10, Add Extra.* (Materials: Individual 10-frames; 14 counters—eight one color, six a different color.) Write 8+6 on the chalkboard and let children use counters to model the fact; eight in the 10-Frame, six outside. "Now fill the frame." (Children move two of the six counters into the frame.) "8 and 6—that's 10 and how many extra? (4)" "Yes, for 8 and 6 you can make 10 and add 4 extra to get _?_ (14)". Repeat for other *Make 10, Add Extra Facts.*

Note: Some children like to think of 8+6 this way: Part of it makes 10 (8+2), and 4 extra makes 14."



Use the Strategy * *Write It, Check It.* (Materials: Individuals 10-frames; 14 counters—eight one color, six a different color for each pair of students.) Write the Make 10, Add Extra Facts on the board. Children take turns. One selects a fact and writes the answer. The other uses the 10-frame, as above, to check.

* *Tell What You Think.* (Materials: None.) Write the new facts of this lesson on the chalkboard with a 'think' bubble by each. Invite students to tell what helps them work out answers fast when they don't know an answer. Some students may:

(1) Use +9s they know to answer +8s ("8+5? Just 1 less than 9+5, which I know.")
(2) Use a known double ("6+8? That's 6+6 and 2 more."; or "take one from 8, put it on 6. That's 7+7.")
(3) Make 10, add extra, as in this lesson.

Choose

* *Find, Circle, and Do.* (Materials: Page of addition facts—those of this lesson and other review facts.) Children find and circle all unknown facts on the page they would answer using the strategy identified in the Tell What You Think activity. They then complete these first, before turning to other facts on the page.

Speed Up

* *How Many?* (Materials: Flash cards for the "Make 10, Add Extra" Facts and other known facts.) Flash the cards and see how many the class can answer in a minute. Repeat a second time and see if this record can be broken.

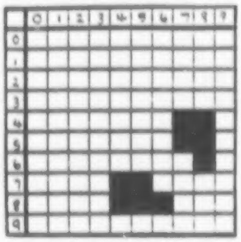
Check Up

Jiffy Quiz
Addition 1, 2 or 12
p. 201, 202, 212

FOCUS ON the following facts and their turnarounds:

7+4, 7+5, 8+4, 8+5, 8+6

—and other facts previously studied.



When mastery is demonstrated by most students, mark these last facts off the Class Cross Out list and have a well deserved party!

Subtraction:

Sample Lessons

- Count Backs
- Add to Check
- Zeros
- Subtraction Doubles
- 10-Frame Facts
- Subtraction Partner Facts
- Families of Subtraction Facts
- Count Ups
- Other Teen Minuend Facts
- "Zero Finger" Facts

Instructional Strategies To Help Children Memorize Subtraction Facts

Ten sample subtraction lessons, each based on the six-step instruction framework proposed earlier in this resource, are listed on the previous page. For most children in the early primary program, teaching the facts in the sequence suggested by this list has proved most useful.

When planning for subtraction number fact work and before beginning any lesson, it is assumed that one would check necessary prerequisites—those given in the Look Ahead Activites section. Major prerequisites include firm mastery of related addition facts, concept understanding for both addition and subtraction, and appropriate counting skills.

An important instructional thrust in subtraction work is to lead students to use the most efficient procedure of which they are capable for deriving correct answers to *unknown* facts. "Levels of maturity" in subtraction fact response are outlined below. At each level, a teacher's role would be to nurture growth to a higher level.

Levels of Maturity in Subtraction Fact Response
(low to high)

Children:

- Make no attempt to respond or do so in a way which indicates inadequate concept understanding.
- Show all: On fingers or with counters--count out the "whole," take some away and count what's left.
- Count up/back to determine answer.
- Use a picture or other visual to stimulate recall of certain facts (e.g. Doubles, 10-Frame Facts).
- Use an easier, known addition or subtraction fact (mental instead of counting strategy).

Major Instructional Thrusts

The overriding goal of the subtraction program is mastery of facts to the level of automatic recall (memorization), with retention over time. Adequate practice and systematic review after "strategy teaching" is necessary, as is on-going review of addition facts. The following five basic steps summarize the major instructional thrusts for subtraction:

1. Explicitly intervene to teach correct, efficient ways to work out answers to unknown facts. (Carry through all six aspects of each lesson.)
2. Later provide "Add to check" activities.
3. Eventually carry out "Partner" activities.
4. Also provide "Family" activities.
5. Continue systematic review.

If Count Backs are not mastered, plan to turn to other math topics before presenting subtraction Count Ups. One of the most important types of activities which teachers can provide students are those which emphasize "Adding to Check." The recommendation is to treat this very important type of activity before turning to fact families as a way of focusing on building understanding of the addition-subtraction relationship and transition to lessons which follow.

Count Backs

Verbal Prompt: "See -1, -2, -3? Start big and count back".

There are 27 Count Backs: (10,9,8,7,6,5,4,3,2) - 1;
(11,10,9,8,7,6,5,4,3) - 2; and
(12,11,10,9,8,7,6,5,4) - 3.

Look Ahead In addition to adequate concept understanding for subtraction, firm mastery of related addition facts and adequate counting skills are important prerequisites.

---

* *How Many Numbers Do You Hear?*

* *Say and Stand.*

* *Touch Your Toes.*
(Time and Again Activities)

* *Say and Peek!* (Materials: Demonstration clock.) Point to one number on the rim of the clock while shielding those immediately before that number with your arm or a paper. Direct students to count back two or three numbers, beginning with the number shown. Uncover and check.

Note: When counting back two or three numbers: vocally emphasize the first number, pause, continue counting, and emphasize the last number said.

Example: **11**, ...10, 9, **8**.

Teach a Strategy * *Break Off!* (Materials: 12 unifix cubes for each pair of students). Let students team with a partner. One copies the Count Back fact from the board, the other "works the cubes." For 9 - 3, direct children to make a train to represent the whole (a "9" train). "Count backwards as you act out 9 - 3." Give one cube at a time to your partner as you count back. Circulate to check for accuracy in this count. Check by modeling the correct count yourself or calling on a child to show what they did. Be sure the partner records how many were left in the train (in this case, 9 - 3 = 6). Repeat for other Count Backs.

* *Count Back* (Materials: Unifix cubes, folded paper and flashcards for Count Backs.) Children take turns with a partner. One selects a count back fact. The other models the solution by (1) laying out unifix cubes for the subtrahend (e.g., seven cubes); (2) covering cubes, one by one, while counting back to subtract; then (3) checking that the last number declared in the count back is the same as the number of cubes not yet covered by the tent-shaped, folded paper.

FUN
Count back
7-2

Use the Strategy * *See and Count Back.* (Materials: Flash cards for Count Backs.) As you show each card, children say the "whole" (minuend). Model the backward count to the answer. After a few facts, switch roles. Say the minuend. Now the children count back aloud to derive the answer.

Choose * *Clap!* (Materials: Flash card for Count Backs mixed with other subtraction facts.) As you flash the cards have students clap every time they see a count back. For every count back, call on a child or (occasionally) you yourself count back aloud and give the answer.

Speed Up

* *Count Backula*. (Materials: A -1, -2, or -3 card for each child.) Write a number on the chalkboard (5-12), and call out -1, -2, or -3. All children holding that card stand and give the answer. From time to time have students trade cards.

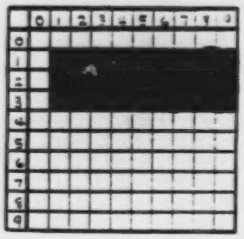
Check Up

Jiffy Quiz
Subtraction 1
p. 215

FOCUS ON the following facts:

(10, 9, 8, 7, 6, 5, 4, 3, 2) - 1;
(11, 10, 9, 8, 7, 6, 5, 4, 3) - 2; and
(12, 11, 10, 9, 8, 7, 6, 5, 4) - 3;

—and other facts previously studied.



When mastery is demonstrated by most students, mark the Count Backs off the Class Cross Out list.

Add to Check

When students can comfortably count back to find answers, provide Add to Check activities such as those suggested on the following pages.

Add to Check

Verbal Prompt: "When you know addition,
you know subtraction too."

Clearly, the most efficient way to answer UNKNOWN subtraction facts is to use known addition facts to provide the answer.

Example: I know 12 - 3 = 9 because 3 + 9 = 12.

Very young and developmentally immature children are not ready to reverse their thinking in an abstract situtation like this. They find it difficult to "think addition" when the problem in front of them is subtraction. Indeed, for these children, there may be a time lag between recognizing the subtraction-addition relationship and using it to provide answers to unknown subtraction facts. This belief has prompted the careful cultivation in this resource of efficient counting and picture strategies to help answer "easy" subtraction facts, and gradually to build the subtraction-addition relationship and its use is through "Add to Check" activites such as those presented below.

Look Ahead

- *Check for mastery of related addition facts.*

Teach a Strategy

- *Break a Stick.* (Time and Again Activity 11)
- *Apart and Back Again.* (Materials: For each pair of students, up to 18 small counters and an individual chalkboard.) Let students work in pairs. One child writes a subtraction fact (with answer) on the chalkboard. The other uses counters in two hands to show first the subtraction, then the "add to check" fact. The first child writes the add to check fact as it is illustrated. (Or, alternately, the second child writes the Add to Check fact and the first child then models this with counters.)

Example:
Child 1 **Child 2**

Subtract: $\begin{array}{r} 12 \\ \underline{-3} \\ 9 \end{array}$ Starts with 12 counters, three in one hand
Moves 3 kernels away and says:"12 - 3 = 9"

Add to check: $\begin{array}{r} 12 \\ \underline{-3} \\ 9 \end{array}$ $\begin{array}{r} 3 \\ \underline{+9} \\ 12 \end{array}$ Moves the two hands together again. "Because 3 + 9 = 12"

Note: If children say "Because 9 + 3 = 12, be accepting."

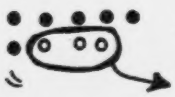
Use the Strategy

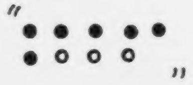
* *Pair Up*. (Materials: Page of subtraction facts.) Suggest that students circle two or three favorite problems on the page and do these first. Beside each, they should write the "Add to Check" fact. Circulate among children during the first few minutes of this independent work period. Keep a checklist and mark off names of students who can show you, using counters, that the Add to Check fact they've written beside one of the circled problems is indeed the correct "match." Within a week, try to get around to every child in this way.

Sample action by children who circled 9 - 3

9 - 3 = 6 3 + 6 = 9

because

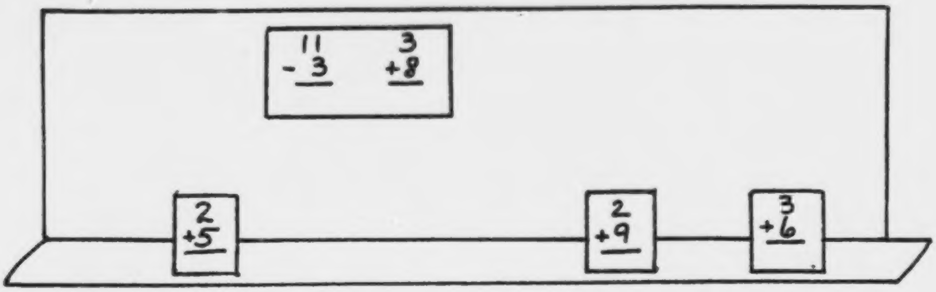




(Later, for Subtraction Doubles and 10-Frame Facts, children could use Say and Check cards to validate their work.)

Choose

* *Find It, Write It*. (Materials: Flash cards for subtraction and related addition facts.) Coming in from lunch or gym, or..., children pick up subtraction fact from a box near the door and try to locate the "Add to Check" fact along the chalk ledge.



Children copy the subtraction and its "Add to Check" fact onto the chalkboard, then draw a box around it. Students return the flash cards to the flash card boxes on the teacher's desk (addition in one box, subtraction in another).

They then return to their seats, copy and complete as many of the problems written on the board as is possible in the time you allow.

When you decide time is up, quickly write answers to the board problems so children can check their work. Talk out loud and involve children. "7-2=? (5) because 2+5=? (7); 11-3=? (8) because 3+8=? (11)... and so on. Build on accountability. Collect papers or simply ask: "How many correctly completed at least 3 matches? 5? Did anyone manage all 8?...Good!"

Speed Up * *Write Fast!* (Time and Again Activity 12)

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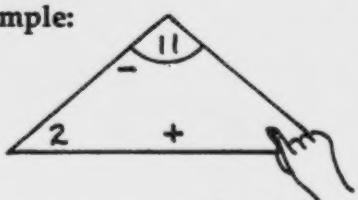
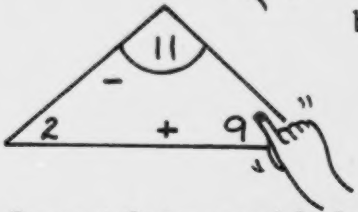
* *Two Will Do.* (Materials: Finger flash cards from the Card Set pattern in Appendix C.) Children take turns with a partner. One child hides the answer until the other writes the complete subtraction and the related Add to Check fact. Lift the finger to check.

Example:



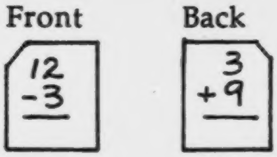
"Yes, 11 - 2 = 9;



because 2 + 9 = 11."

* *Bottom Up*. Suggest that one quick check is to place a finger over the minuend of the completed problem, add the other two numbers. Then lift the finger to check that the total is the minuend.

* *On the Back*. (Materials: Addition/Subtraction flash cards found in Appendix C.) Show a subtraction card and ask students to tell the Add to Check fact on the back. Show the flip side of the card to check.



Note: It helps to clip one corner of the cards as shown, so it's easy to tell when all subtraction facts are face up.

**Tap Happy*. (Materials: Subtraction/Add to Check flash cards, found in Appendix C; envelope of 0-9 digit cards for each child) As cards are flashed, children, try to tap the answer digit before you say it. From time to time call on a child to tell the Add to Check fact.

Zeros

Verbal Prompt: "Take all, leave none.
Take none, leave all."

There are 19 Zeros: (9,8,7,6,5,4,3,2,1,0) - 0;
9-9, 8-8, 7-7, 6-6, 5-5, 4-4, 3-3, 2-2, 1-1.

Look Ahead

These facts tend to be very easy for children. A firm mastery of the subtraction concept and of related addition facts are adequate prerequisites. The concept of subtraction is reinforced in the "Teach Strategy" activities.

Teach a Strategy

* *You Take.* (Materials: Small counters.) Model "taking none" as well as "taking all" the counters. Each time, children write the matching fact. Then reverse roles. Write a subtraction Zero fact on the board for the children to model.

Use the Strategy

* *Take All, Take None.* (Materials: Tens/ones materials; calculator.) Using numbers within children's understanding, allow them to use a calculator or tens/ones materials to generalize that when you take all, you leave none; and when you take none, you leave all.

Choose

* *Stand Up!* (Materials: Flash cards for Zeros and other subtraction facts previously studied; individual chalkboards.) Flash the cards, one at a time. Students stand up when they see a Zero fact. (Call on one student for the answer.) They otherwise write the answer on their boards and show it.

Speed Up

* *Flash! Flash!* (Materials: Flash cards for Zeros and Count Backs; envelope of 0-9 cards for each child.) Children lay out the cards 0-9 in a row across the top of their desks. As Zero and Count Back fact cards are flashed by the teacher, child flashes back the answer card.

* *Touchdown!* (Materials: Flash cards for Zeros and other review facts; individual chalkboards.) Appoint one child as referee. Flash each card then let it fall to the desk. When it touches the desk the referee calls "Touch!" and the teacher says the answer. Students who write a correct answer before the referee makes a call earn one tally point.

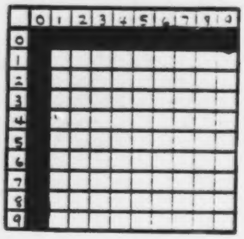
Check Up

Jiffy Quiz
Subtraction 2 or 3
p. 216, 217

FOCUS ON the following facts:

(9,8,7,6,5,4,3,2,1,0) - 0;
9-9, 8-8, 7-7,6-6, 5-5, 4-4, 3-3, 2-2, 1-1

—and other facts previously studied.



When mastery is demonstrated by most students, mark Zeros off the Class Cross Out list.

Add to Check

When students feel confident with Zeros, provide Add to Check activities like the following and others in the Add to Check section.

* *Pair Up*. (Materials: Page of subtraction facts.) Suggest that children circle one or two Zero Facts on the page and do these first. Beside each, they should write the Add to Check fact. Children should be prepared to use objects to validate their choice of facts, should you ask them to do so.

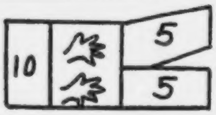
Subtraction Doubles

Verbal Prompt: "Picture the double."

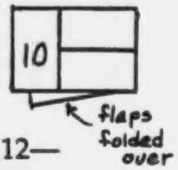
There are 6 Doubles: 8-4, 10-5, 12-6, 14-7, 16-8, 18-9.

Look Ahead Firm mastery of addition doubles is necessary.

Teach a Strategy * *Can You See It?* (Materials: Say and Check cards for Subtraction Doubles.) Cut on the dotted line and fold to hide the picture.



Introduce the cards as below but let students respond orally rather than writing the first few times.



Show the card, flaps open (e.g. the egg carton card.) "How many eggs?" (12—Children write this total.) Fold both flaps to cover the picture. "How many eggs did I hide?" (12) Open one flap. "How many eggs did I take away from hiding?" (6) Have children write 12 - 6. "How many eggs are still hidden?" Have children complete and show you the number sentence: 12 - 6 = 6 ***Open the second flap to check.*** Repeat for other Subtraction Doubles.

Use the Strategy

* *See, I'm Right.* (Materials: Say and Check cards for Subtraction Doubles; page of subtraction Doubles and other review facts.) Have children circle one or two Doubles and do these first. As you circulate among students, provide Say and Check cards, on an individal basis, students can use the cards (as above) to validate to you what they've written.

Choose

* *Write, Show and Tell!* (Materials: Flash cards for Subtraction Doubles and other review facts; individual chalkboards). Students write the answer to each card flashed on their boards and show it. The teacher then calls on a child who should describe it (e.g. "a Count Back" or "a Double.") IF THE FACT IS A DOUBLE, the student who answered can call on a classmate to name the Doubles picture.

* *You Show Me!* (Materials: Flash cards for Doubles and other subtraction facts previously studied; two small pieces of paper for each child). Have students write "Count Back" on one paper scrap and "Double" on the other. Children place one paper in each hand and, for each card flashed, hold up "Count Back" or "Double" to identfy the fact. In response, say:

1) "Good, a Count Back!—11,...10, 9, (pause so children can say the answer); OR
2) "Yes, 14-7 is the calendar Double, 14-7= (pause so children can say the answer).

Speed Up

* *Seven is Heaven.* (Materials: Paper folded in fourths and each part numbered 1 through 7. Children keep the paper folded so they work only on one fourth of the page each time).

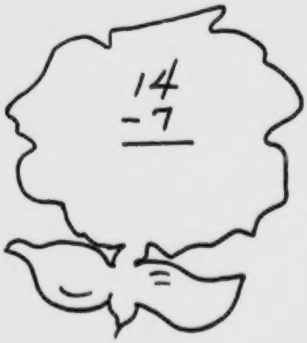
Enter seven Doubles, Zeros or Count Backs on your copy of the score sheet to form a calling sheet. Call out the facts one at a time and have the children write their answers on their sheets. The length of time allowed for students to write an answer should gradually be decreased from one game to the next:

> **Example:** In the first game, allow up to 5 seconds for each answer; in the second allow 4 second for each fact; in the third, 3 seconds; and in the fourth game, 2 seconds for each answer.

Use the same seven facts for each game, but call them in a different order each time. A child's score in Game 1 is the number correct plus 1, in Game 2: number correct plus 2; in Game 3: number correct +3; and in Game 4: number correct +4.

As children become more sure of themselves, you might cut the response time to 4, then 3, 2 and 1 second(s) per fact for consecutive games.

* *Catch a Leaf/Snow Ball/Snowflakes/Christmas Gift* (Materials: Simple seasonal pictures cut from construction paper, one per student. Write a subtraction Count Back or Double on each picture.) Name the activity to fit the picture. Write a number (1-9) on the board. If this number is the answer to the fact they have in hand, students stand. Then, before you count to five, these students trade facts with someone who is sitting. Repeat.



* *Shape Up*. (Materials: Pupil-drawn △6 □7 ⑧ □9 cards for each child; flash cards for subtraction Doubles and other review facts having answers 6, 7, 8 or 9.) As facts are flashed, children hold up the answer shape.

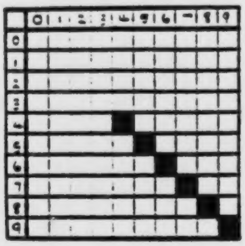
Check Up

Jiffy Quiz
Subtraction 4 or 5
p. 218, 219

FOCUS ON the following facts:

8-4, 10-5, 12-6, 14-7, 16-8, 18-9,

—and other facts previously studied.



When mastery is demonstrated by most students, mark subtraction Doubles off the Class Cross Out List.

Add to Check

When students feel confident with subtraction Doubles, provide Add to Check activities like the following and others in the Add to Check section.

Teach a Strategy

* *Picture Check.* (Materials: Say and Check cards for subtraction Doubles, found earlier in this section; flash cards for subtraction Doubles.) Distribute the flash cards and the Say and Check cards among students. Those without cards go to the board as recorders.* Children with cards match up and go to a chalkboard recorder who writes what is said.

Example: Child with 14 - 7 says, "14 - 7= 7." Child with the Calendar Say and Check Card adds: "That's right, because 7 + 7 = 14. See?" (Child points to the two sevens on the card, and the total, 14.) Quickly check over the board work, redistribute cards to different students and repeat the activity.

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* If the group is large, appoint students to stay at their seats and make a written record (to be turned in to you) of what's recorded on the chalkboard.

10-Frame Facts

Verbal Prompt: "See 10 - ? Think of the ten frame."

There are 7 new Easy 10-Frame Facts: 10-4, 10-6, 10-7, 10-8, 10-9; also: 9-5, 9-4.

Look Ahead

1. Check for strong visual imagery for the 10-frame. Refer to:
   **10-Frame Flash.* (Time and Again Activity 8)
   **Frame and Fill.* (Time and Again Activity 9)

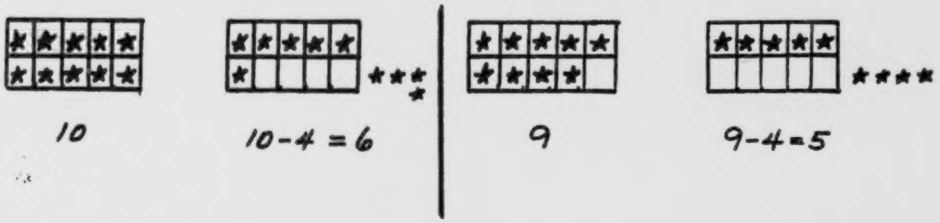
2. Check for firm mastery of related 10 sums of, 5+4 and 4+5.
   **Make 10.* (Materials: Individual chalkboards; individual 10-frame cards; and small counters.)

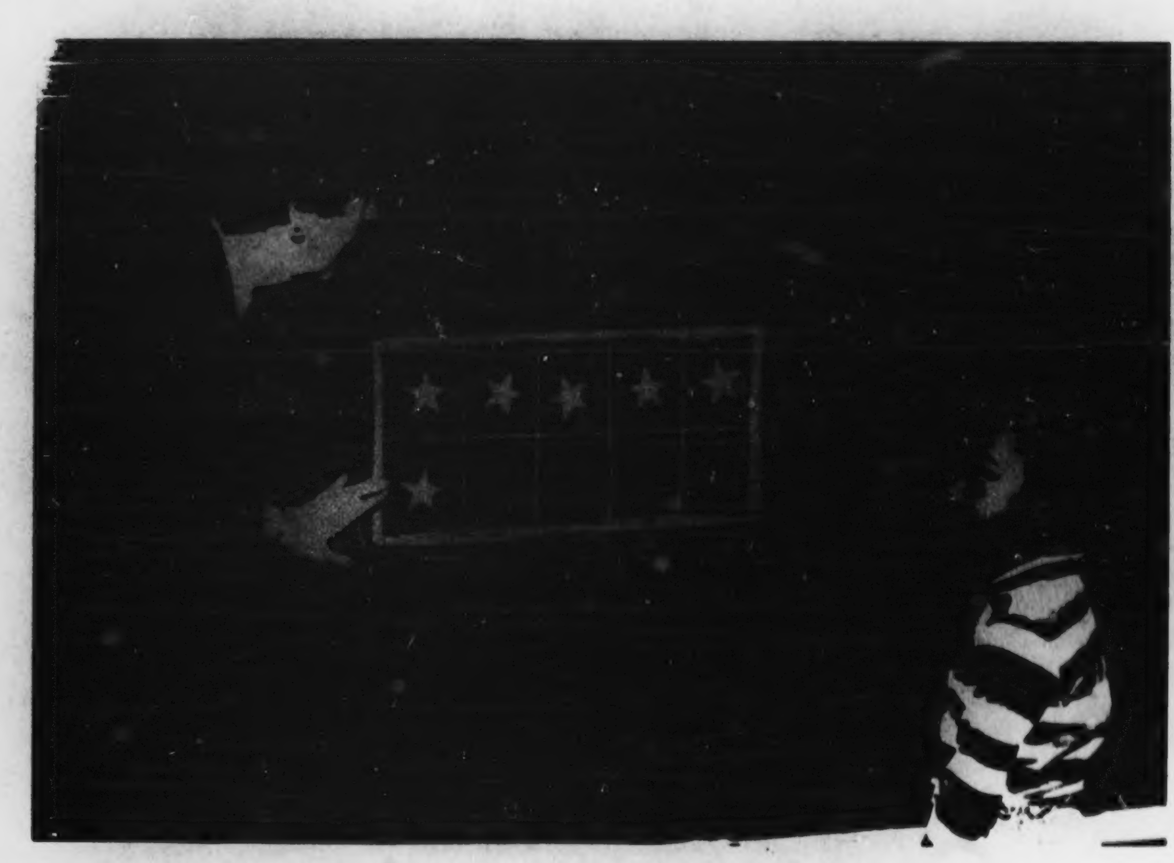
   - Say or write a number (2-9) on the classroom chalkboard. Have students write on their chalkboards the number which, when added to your number, makes 10. Call on individual students to check selected problems on an individual or overhead 10-frame.

   Note: For 5+4 and 4+5, get students to note that all but one in the frame is filled (9).

Teach a Strategy

* *Put In, Take Away.* (Materials: Individual 10-Frame in Appendix C and ten counters for each pair of students; flash cards for 10-Frame Facts.) Show a fact card and have students take turns modeling the subtraction on their 10-frames: One child puts in 9 or 10 counters; the second child takes away part of the counters as to model the fact shown. Children take turns writing the matching number sentence.



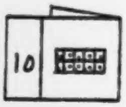


Use the Strategy

* *Say And Check.* **(Materials: Individual 10-frame and ten counters for each pair of students; individual chalkboards; flash cards for the 10-Frame facts; 10-Frame Say and Check cards).**

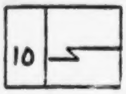
Students write the answer to each card flashed. From time to time, when the teacher calls "Check!" students work together with a partner to check their answer on a 10-frame. Alternately, let students use an overhead 10-frame or the 10-frame Say and Check, as below, to check.

Show all: "How many?"



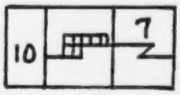
"10"

Hide all: "How many hidden?"



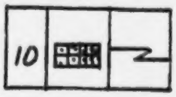
"10"

Take away from hiding: 10-7



"How many left in hiding?" (3)

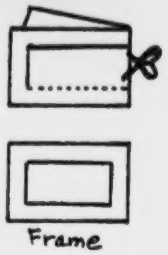
Open to check:



3 is right.

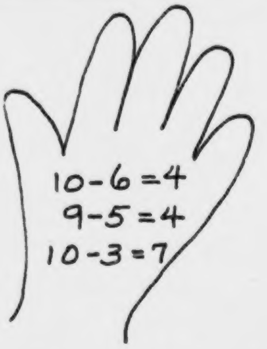
Choose

* *Frame It!* (Materials: Flash cards for subtraction 10-Frame and other review facts; pupil-made, construction paper frames.) Help students cut a frame from construction paper or tag board, big enough to look through. As cards are flashed, children look through their frames and answer every subtraction 10-Frame fact they see. Use 10-Frame Say and Check cards as needed to help or check.

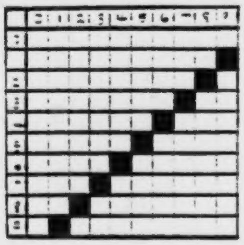


Speed Up

* *Cover!* (Materials: Scrap paper and masking tape.) Have students trace their hand and write three "10-"facts with answers on it. Tape it to their desk top. As you pass by a child during the day, whisper "Cover!" and say one fact. If the child answers correctly, draw a star on the ring finger.



Alternately, say "Cover!" at various times throughout the day as a signal for children to take turns covering, asking, and checking each other's facts.



Check Up

Jiffy Quiz
Subtraction 6, 7 or 8
p. 220-222

FOCUS ON 10-4, 10-6, 10-8, 10-9, 9-5, 9-4,

—and any other "10-"facts previously studied.

When mastery is demonstrated by most students, mark the 10-Frame facts off Class Cross Out List.

Add to Check

When students feel confident with the "10-"facts, provide Add to Check activities like the following and others in the Add to Check section..

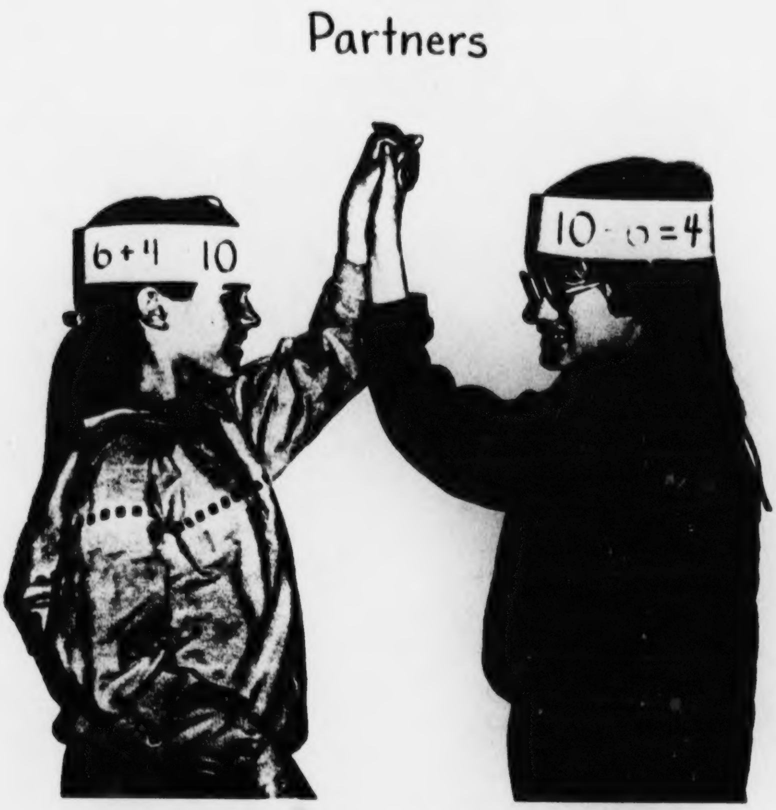
Teach a Strategy

- *Picture Check.* (Materials: 10-Frame Say and Check cards; flash cards for 10-Frame facts.) Distribute the flash cards and the Say and Check cards among students. Those without cards are chalkboard recorders.* Children with cards match up and go to a chalkboard recorder who writes what is said.

Example: Child with 10 - 4 says, "10 - 4 = 6" Child with Say and Check card adds: "That's right, because 4 + 6 =10. See?" (Child points to the 4 and 6 on the card, and the total, 10.)

Quickly check over the board work, redistribute cards to different students, and repeat the activity.

* If the group is large, appoint some students to stay at their seats and make a written record (to be turned in to you) of what's recorded on the chalkboard.



Subtraction Partners and Families of Facts

Provide activities suggested on the following pages.

Subtraction Partner Facts

Verbal Prompt: "Same whole, same parts.
They make good partners."

It will prove helpful to students in the long run if you take the time to focus on related subtraction facts. These are facts that have the same *whole* and the same *parts*. They make good **partners**.

For example: 10 - 7 = 3 and 10 - 3 = 7 are partner facts.
9 - 5 = 4 and 9 - 4 = 5 are partner facts.

Activities to Build the "Partner" Relationship for Subtraction Facts

Look Ahead

* Check for firm mastery of at least one group of subtraction facts before relating to other subtraction facts.

Teach a Strategy

* *Break Up.* (Materials: 10 unifix cubes; individual chalkboards.) Gather students around you. Ask students to write the subtraction problem you dictate on their slates (e.g. 10-7).

Make a unifix train on the table or floor to present the "whole" (10). Ask students to write the number that will be left when you break off 7. (3, Break off the seven and, if necessary, count to check.)

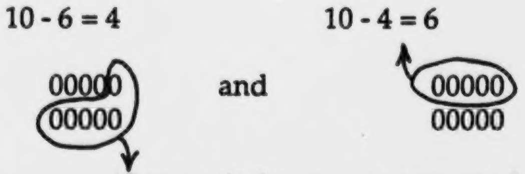
Now show the 10 and break off 3. Without erasing, have students write a second fact to match this action. (10-3=7) "Yes, 10-7=3 and 10-3=7. These two facts have the same *whole* (10). Circle the 10 in each problem on your slate. These two facts have the same *parts* (7 and 3). They make good **partners**." Repeat with other facts.

Use the Strategy

* *Write and Show.* (Materials: Individual chalkboards, 10 unifix cubes, flash cards for known subtraction facts.) As cards are flashed, children answer (in unison), then write and show on their chalkboards the partner fact for each. From time to time, pause and have children rise unifix cubes to validate what is written. Emphasize: "Same whole, same parts: good partners."

- *Side by Side.* (Materials: Workpages of subtraction facts.) Suggest that students circle three favorite problems on a page and do those first. Beside each, they should write the partner fact. Provide paper on which they can draw a picture of one pair of facts:

Example:



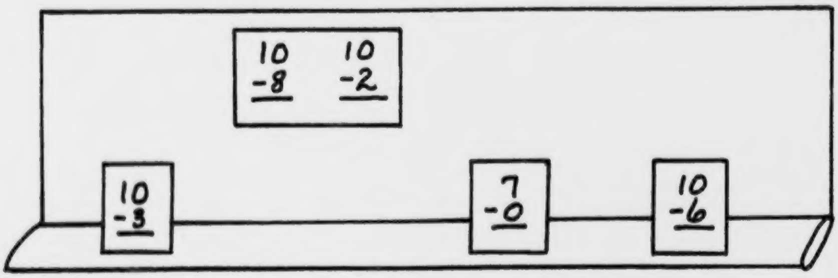
"Same whole, same parts, good Partners."

Better yet, provide small counter and circulate about as students use counter to validate for you the partner facts they have written.

Choose

- *Find Your Partner.* (Time and Again Activity 14)

- *Find It, Write It.* (Materials: Flash cards for related subtraction facts.) Coming in from lunch or gym,or..., children pick up subtraction fact from a box near the door and try to locate the partner fact along the chalk ledge.



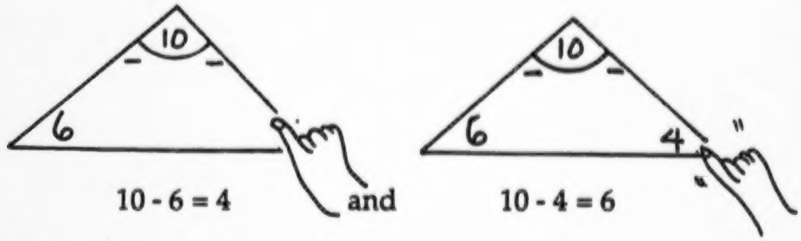
Children copy the subtraction and its "Partner" fact onto the chalkboard, then draw a box around it. Students return the flash cards to the flash card box on the teacher's desk. They then return to their seats, copy and complete as many of the problems written on the board as is possible in the time you allow.

When you decide time is up, quickly write answers to the board problems so children can check their work. Talk out loud and involve the children: "10-3=? (7) and 10-7=? (3); 10-8=? (2) and 10-2=? (8); 7-0=? (7) and 7-7=? (0);
10-6=? (4) and 10-4=? (6)," and so on. Build in accountability. Collect papers or simply ask: "How many correctly completed at least 3 matches? 5? Did anyone manage all 8?...Good!"

Speed Up

* *Two Will Do.* (Materials: Finger flash cards from the p. pattern.) Children take turns with a partner. One child hides the answer until the other writes and completes both the subtraction and its related partner fact. Lift the finger to check.

Example:



10 - 6 = 4 and 10 - 4 = 6

* *Write! Write!* (Materials: Individual chalkboards.) Write a subtraction fact on the board and see how fast children can write and show you the Partner fact. Emphasize the language: "Same whole, same parts, good partners."

Families of Subtraction Facts

Verbal Prompt: "To know one is to know
all in the family."

The ability to recognize and use relationships between number facts has valuable applications and extensions to mental math and estimation. Forming "families of facts" provides experences in relating numbers in useful ways that enhance this ability.

Most fact families consist of four facts, two related addition facts (turnarounds) and two related subtraction facts (partners) which involve the same triple of numbers--the whole and its two parts:

Examples: 6 + 4 = 10, 4 + 6 = 10, 10 - 6 = 4, 10 - 4 = 6;
9 + 2 = 11, 2 + 9 = 11, 11 - 2 = 9, 11 - 9 = 2.

Subtraction Doubles have small families--two facts.

Examples: 8 + 8 = 16, 16 - 8 = 8;
5 + 5 = 10, 10 - 5 = 5.

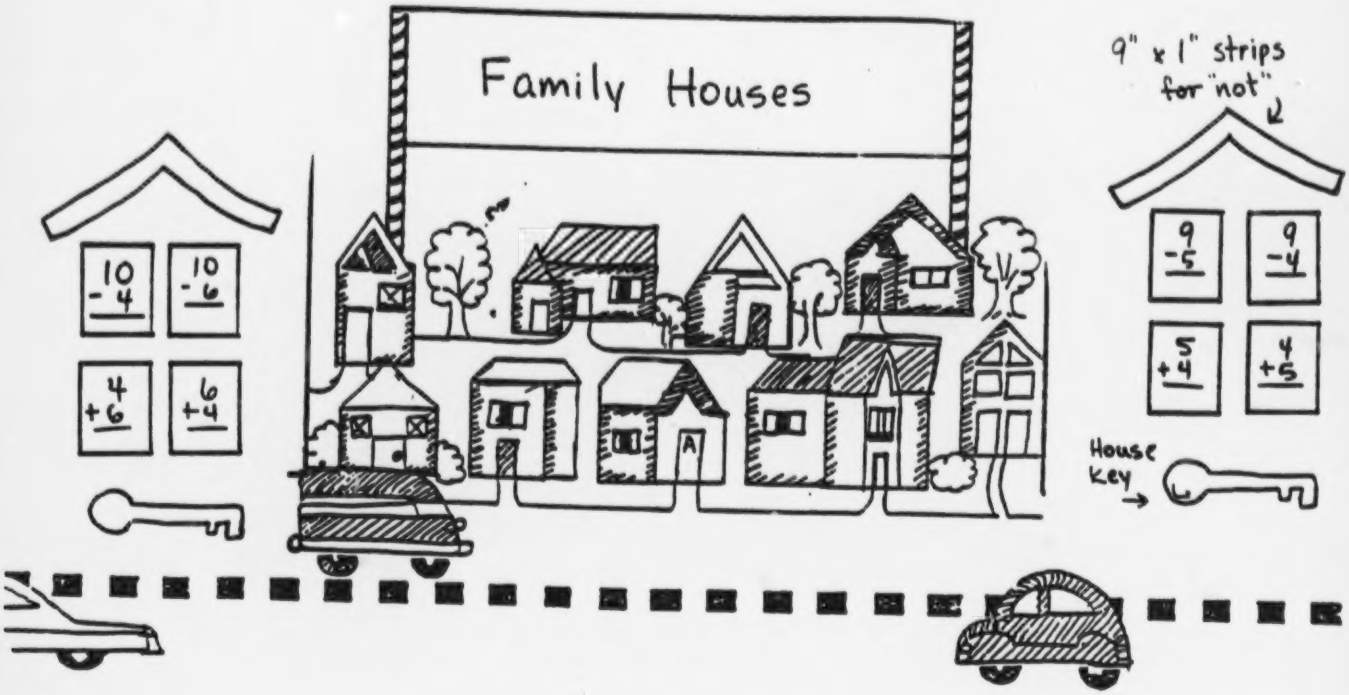
Activities like the following, structure the study of fact families in the number fact program. These activities consolidate learning and promote retention.

Look Ahead Check for mastery of the addition and subtraction facts involved in the fact families to be identified or formed.

Teach a Strategy * *To Know One is To Know All.* (Materials: Chips or other small counters.) Use chips in two hands, apart/together, to illustrate all the facts in one family. Verbally emphasize that when you know one, you really know all in the family.

Use the Strategy

* *Family Houses.* (Materials: Subtraction flash cards and cards for related addition facts; construction paper keys (one for each family of facts); 9" x 1" construction paper strips, (two for each family of facts); unifix trains.) Children work with a partner. They sort the facts by family, as shown, then use unifix trains to check. If all is in order, the house is "sold." That is, the roof (two 9" x 1" paper strips) is put in place and the house key is put in place.

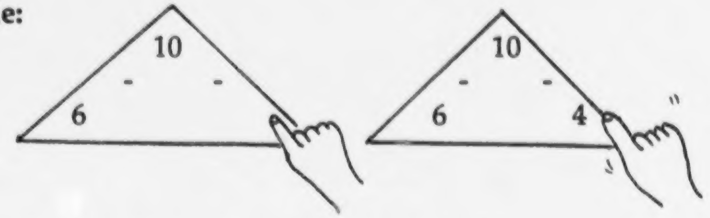


* *Pass the Bucket.* (Materials: Subtraction flash cards; individual chalkboards; bucket or box of counters.) As each fact is flashed, children write and show other facts in the same family. From time to time, "pass the bucket" or box of counters to a child to validate what has been written. (Child would put the counters in two hands, apart/together, to illustrate all facts in the family.) Verbally emphasize that when you know one, you really know all in the family.

Choose * *Join Your Family.* (Time and Again Activity 15)

Speed Up * *Write It All.* (Materials: Finger flash cards from the Card Set pattern in Appendix C.) Children take turns with a partner. One child places a finger over one number in the triangle until the other writes and completes all number sentences in the family of the visible fact.

Example:



10 - 6 = 4, 10 - 4 = 6, 4 + 6 = 10, 6 + 4 = 10.

Count Ups

Verbal Prompt: "When the numbers are 'close neighbors', count up."

There are 15 Count Ups. These are facts in which the numbers are "close neighbors"—(12,11) - 9; (11,9) - 8; (9,8) - 7; (9,8,7) - 6; (8,7,6) - 5; (7,6,5) - 4. In each case the *answer* is 1, 2 or 3.

Note: If beginners deal with Count Backs, Zeros, Doubles and "10-" facts in the manner suggested earlier in this book, then some students won't need to count to work out answers to the new facts of this lesson. They'll be able to use addition or subtraction partner facts to answer the new facts.

Examples: "9 - 7—that's 2, because 7 + 2 = 9." or
"9 - 6—that's 3, because 9 - 3 = 6."

Try to identify students who can handle mental relationships like these (e.g. "addition gives the subtraction answer," and nurture their thinking through the Add to Check activities. For those students who developmentally are not "ready" for anything but counting, try the suggestions which follow.

Look Ahead Check for mastery of the Count On and Auditory Patterning activities . Firm mastery of related addition facts and all other "easy" subtraction facts (i.e. count backs, zeros, doubles and "10-" facts) is important.

Teach a Strategy * *Elevator Going Up!* (Materials: 12 unifix cubes for each child.) Have students make a stack of 9 cubes. "This is your elevator. Start at ground floor and move a finger partway up—to the 6th floor (top of the 6th cube). If the lights inside the elevator that tell what floor you're on are working, what number is lit?" (6)

"Close your eyes—can you see the 6? Now start on the 6th floor and move your finger up the cube stack as the elevator goes to the top floor. Count up to tell the floor numbers that light up on the way. Ready?" (6—7,8,9) Have students open their eyes and examine the corresponding fact written on the chalkboard:

$$\begin{array}{r} 9 \\ \underline{-\ 6} \end{array}$$

Relate to the "Elevator Going Up" action: "You want to go to the 9th floor. The elevator goes partway up and stops on 6-- then goes on up: **7, 8, 9.** From 6, **how many floors did you go up?** (3). Yes, 9 - 6 = 3." Point out that because the numbers are "close neighbors," this is a good Count Up fact. It doesn't take long to count up from the part you know You can do it in your head. Repeat for other Count Up facts.

Get children to note that when the numbers are just one floor apart (next door neighbors), as in 8 - 7, 6 - 5, or 4 - 3, the answer is 1. No counting is necessary. Use cubes to model this thinking. Occasionally, throughout the following activities, use cube stacks to check a count made.

Use the Strategy

* *Count Up!* (Materials: Count Up cards.) Show each card and get children to say the part they know (e.g. "8" in 11-8); you model how to count up and tell the answer. If necessary, especially in the beginning, this count should be "out loud." After a while, switch roles.

Choose

* *Thumbs Up!* (Materials: Flash cards with a mix of Count Ups and other known facts.) Students hold thumbs up for Count Ups, thumbs down otherwise. After each Count Up is identified, say the known part and pause so students can count up and tell the answer. Other facts should not be answered. Watch that students don't count for facts they already know.

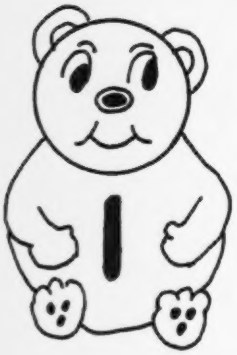
* *Simon Says.* (Materials: Individual chalkboards.) Give directions like: "Simon says, write a Count Up." "Simon Says, write a Double." Facts and their answers should be written on the boards each time and shown. Occasionally leave out the phrase "Simon Says," upon which students should do nothing (Simon didn't say!).

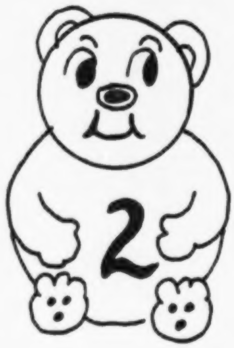
> *Note:* At some point tell students: "If you count quietly (to yourself) and quickly, you'll say the answers so fast everyone will think you just 'know' these facts." . . . This also is a good time to let children sort Count Ups and other facts by strategy.

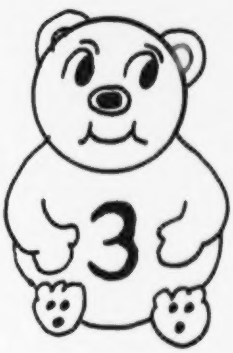
Speed Up

* *Race Row/Box*. (Materials: Worksheet with rows of Count Ups and other easy facts.) Give students time to "study" the first two rows on the page. Help them with any "hard" facts. Then say, "Your *Race Row* is row____" (choose 1 or 2). Allow about 2 seconds/facts, then call "Stop!" and check answers. Let students draw stars by rows if they beat the time and had correct answers. Repeat for other rows/boxes on the page.

* *Tickle a Bear!* (Materials: Three "giggling bears" labeled 1, 2 or 3 on the tummy; flashcards for Subtraction Count Ups.) Distribute the flashcards to students. These are the "feathers." When you hold up the "2" bear, all students holding a card having 2 as an answer stand, wiggle their feather (flashcard) to make the bear giggle, then trade cards with a neighbor. Repeat for other bears as time allows.







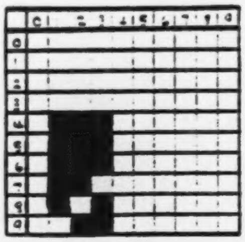
* *Safari*. (Materials: Safari board and chance cards, in Appendix C; set of Count Up cards mixed with other review facts; game markers.) This is a game 2-3 players. Follow directions found in Appendix C.

Check Up

Jiffy Quiz
Subtraction 9-11
p. 223-225

FOCUS ON: (12,11) - 9; (11-9) - 8; (9-8) - 7;
(9,8,7) - 6; (8,7,6) - 5; (7,6,5) - 4

—and other facts previously studied.



When mastery is demonstrated by most students, mark Count Ups off the Class Cross Out list.

When students feel confident with Count Ups, provide Add to Check, Partner and Family activities like those below (refer also to other sections).

Add to Check

Teach a Strategy * *Take and Do.* (Materials: Bag of cards for Count Ups—with a blank reverse side; unifix cubes.) As children come into the room from recess, lunch, gym, . . . they take a card from the bag, answer it, and write the Add to Check fact on the back. They then trade with a neighbor who uses unifix trains, apart/together, to check.

Use the Strategy * *Touch!* (Materials: Individual chalkboards; cards for Count Ups and a separate set for related addition facts.) Distribute the cards to students. Then, as you call out one subtraction fact, the child holding the card comes to the front of the room, answering the fact on the way. Others try to write and show the Add to Check fact before the child holding this addition card brings it to the front, touches it to the related subtraction fact, and says: *"Touch!"*

Partner Facts

Use the Strategy * *WRITE and SHOW.* (Materials: Individual chalkboards; unifix trains; flash cards for subtraction Count Ups.) As cards are flashed, children answer (in unison), then write and show the partner fact for each on their chalkboards. Emphasize: "Some whole, some parts; good partners."

Families of Facts

Teach a Strategy * *To Know One is to Know All.* (Materials: Chips or other small counters.) Children use chips in two hands, apart/together, to model all facts in one family.

Other Teen Minuend Facts

There are 26 Other Teen Minuend Facts: 11-(7,6,5,4); 12-(8,7,5,4); 13-(9,8,7,6,5,4); 14-(9,8,6,5); 15-(9,8,7,6); 16-(9,8,7); 17-(9,8).

Look Ahead

Firm mastery of related addition facts is important. If they are not memorized, the most efficient way to derive answers to the teen minuend facts of this lesson is to use the related addition facts to help. This basic approach and alternatives are discussed below and in the Zero Finger lesson.

Teach a Strategy

1. **Basic Approach:** Use addition to answer *UNKNOWN* subtraction facts.

   Example: "13 - 5--that 8, because 5 + 8 = 13."

   Verbal prompt: "Addition gives the subtraction answer."

   Focus on the "Addition gives the subtraction answer" idea.

   * *Break a Stick* and *Write Fast!* (Time and Again Activites 11 and 12)

2. **Alternatives to using addition.** Some students find the following ideas useful.

   a. Relate to a subtraction double.
   Some children who know the subtraction doubles relate all unknown facts to an easier, known double. They cue in on the *subtraction* as a clue, think of the answer to the subtraction double, then adjust up or down to solve.

Examples:

12 - 7: "Think of the double with a 7:
14 - 7 = 7, so 12 - 7 is 2 less (5).

14 - 5: "Think of the double with a 5:
10 - 5 = 5, so 14 - 5 is 4 more (9).

13 - 8: "Think of the double with a 8:
16 - 8 = 8, so 13 - 8 is 3 less (5).

b. Use number patterns for "- 9" facts. Most students note that the answer digit is one more than the one's digit of the minuend.

Example: 14 - 9 = 5 (The answer digit, 5, is one more than the digit "4.")

Other number patterns which some students or teachers may like include:

- The sum of the minuend digit is the answer.
  Example: 14 1 + 4 = 5
  -9

- Subtract 10 and add one.
  Example: 14 - 10 = 4, so 14 - 9 = 1 more (5).

- When the sum of teh minuend digits equals the part taken, the answer is always 9.
  Example: 16 1 + 6 = 7, so the answer = 9.
  -7

c. Use the "one more than" idea for facts with minuends near 10 and facts near a subtraction Double.

Example: 10 - 6 = 4, so 11 - 6 = 1 more (5).
14 - 7 = 7, so 15 - 7 = 1 more (8).

If none of the above seem to help, and students are not beginners, try the Zero Finger lesson idea.

Use Addition to Help*

Use the Strategy

- *Snap!* (Materials: Subtraction flash cards for teen minuends; unifix trains for teacher; individual chalkboards.) As you flash the cards students should write and show each answer. Say the answer aloud when most students have shown it. From time to time snap after you say an answer. Tell students this is the cue to write the addition fact that helps with the answer. (For 13 - 7, for example, accept either 7 + 6 = 13 or 6 + 7 = 13.) Occasionally use unifix trains, apart/together to validate that an appropriate fact is given.

- *What's on the Back?* (Materials: Subtraction cards for teen minuends--related addition fact on the back of each; individual chalkboards.) When you show the subtraction side of each card, students should write the "Add to Check" fact on their boards and show. Show the flip side of the card to check.

- *Match Up!* (Materials: Subtraction cards and related addition facts.) For each subtraction card, children match to the "Add to Check" fact.

Add to Check — Fact
10 −3
7 +3

Choose

* *Tell What You Think.* (Materials: Subtraction flash cards for teen minuends; a different set of cards for related addition facts; individual chalkboards.) Place the addition facts along the chalkledge. As each subtraction card is flashed, children answer it (in their slates). From time to time, at your signal, they also write the addition helper fact.

Note: When you feel it is unnecessary to display the addition facts on the chalkledge as a visual prompt, remove them.

Speed Up

* *Answer If.* (Materials: Subtraction flash cards). Write a number (2-9) on the board. Flash cards and direct students to hold thumbs up if the answer is the number written—otherwise hold thumbs down. Call on a child to tell the answer to each thumbs down fact.

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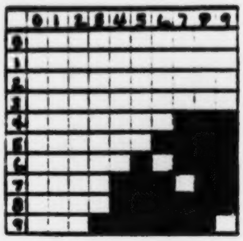
* Use and Choose activities, for the addition strategy only, are presented. Be accepting of alternate thinking patterns and, as appropriate, reinforce these in similar ways. Individuals using alternate strategies can view these as "Add to Check" activities.

Check Up

Jiffy Quiz
Subtraction 13, 14
p. 227-228

FOCUS ON the following facts

11 - (7,6,5,4); 12 - (8,7,5,4);
13 - (9,8,7,6,5,4); 14 - (9,8,6,5);
15 - (9,8,7,6); 16 - (9,7);
17 - (9,8);



—and other facts previously studied.

When mastery is demonstrated by most students, mark these facts off the Class Cross Out list.

Add to Check

If students do not use addition to answer *UNKNOWN* subtraction facts, take the time to build imagery for and use of the subtraction-addition relationship. A simple way to achieve this goal is to carry out many "Add to Check" activities, as suggested below and in the Add to Check section.

Use the Strategy * *Out to Lunch.* (Materials: Cards for teen minuend facts; a different set for related addition facts.) Distribute the cards to students. The SUBTRACTION fact students should find the Add to Check fact (child), "take" it to teacher, and go to lunch, ... gym ... . Children answer their facts as they pass the teacher, then return them to the flash card box near the door before leaving the room.

"15 - 7 = 8 because 7 + 8 = 15."

Note: If the line moves too quickly for every student to answer the assigned fact aloud, point to every third or fourth pair of students to do so.

Partner Facts

It will prove helpful to students in the long run if you take the time also to focus on related subtraction facts as suggested below and in the Subtraction Partner Facts section.

Teach a Strategy * *Match.* (Materials: Cans with partner facts to Clock 5s written on cards with related Partner facts written on the outside of the cans; magnetic tape on the back of each card; answer key—inside each can—or unifix trains.) Children get a partner. One child draws a card, answers it, and sticks it by the Partner fact on the outside of the can (which also is answered). The other child checks using the answer key or unifix trains. When all matches are made and checked, children trade cans and switch roles. This time the second child draws, answers and matches facts while the first child checks.

Families of Facts

To consolidate fact work for known facts and to build or reinforce important number relationships, it will prove helpful to take the time to focus on Fact Families as suggested below and in the Families of Subtraction Facts section.

Teach a Strategy * *Show You Know.* (Materials: Scrap paper and pencil; unifix cube trains.) Write teen minuend facts on the board. Children work with a partner. One child selects a fact, then writes and answers all facts in its family. The other child uses unifix trains, apart/together, to check. Children switch roles for the next fact. When time is up, children write at the top of their paper the number of families they were able to correctly complete. You may wish to collect the papers for your reference.

Zero Finger Facts

Verbal Prompt: "Take from 10, add extras."

There are 26 Zero Finger facts: 11 - (7,6,5,4); 12 - (8,7,5,4); 13 - (9,8,7,6,5,4); 14 - (9,8,6,5); 15 - (9,8,7,6);16 - (9,7); 17 - (9,8).

Look Ahead

*Firm mastery of related addition facts so students can "add to check" and increase the potential of their using addition to derive unknown subtraction facts.

*Ability to subtract any number from 10.

*Ability mentally to add 10 to any 1-digit number.

Note: The Zero Finger Strategy is not appropriate for first year beginners. For other children, it may prove useful for students who cannot seem to use other mental thinking patterns.

Teach a Strategy

* *Take from 10.* (Materials: Individual 10-frames and small counters.) Write 13 - 5 (or some other "hard" fact) on the board. Ask students to lay out 13 counters, ten in the frame and extras outside. "Now take five counters from your picture." Discuss the different ways students did this. " It doesn't matter which five you take, eight are left." Record the answer to the board problem. Come to the agreement that since it's easy to subtract from 10, "We'll take from 10 first, then add the extra to find the total left." Repeat using different facts. The goal in this step is to introduce the vocabulary and idea: "Take from 10, add extras."

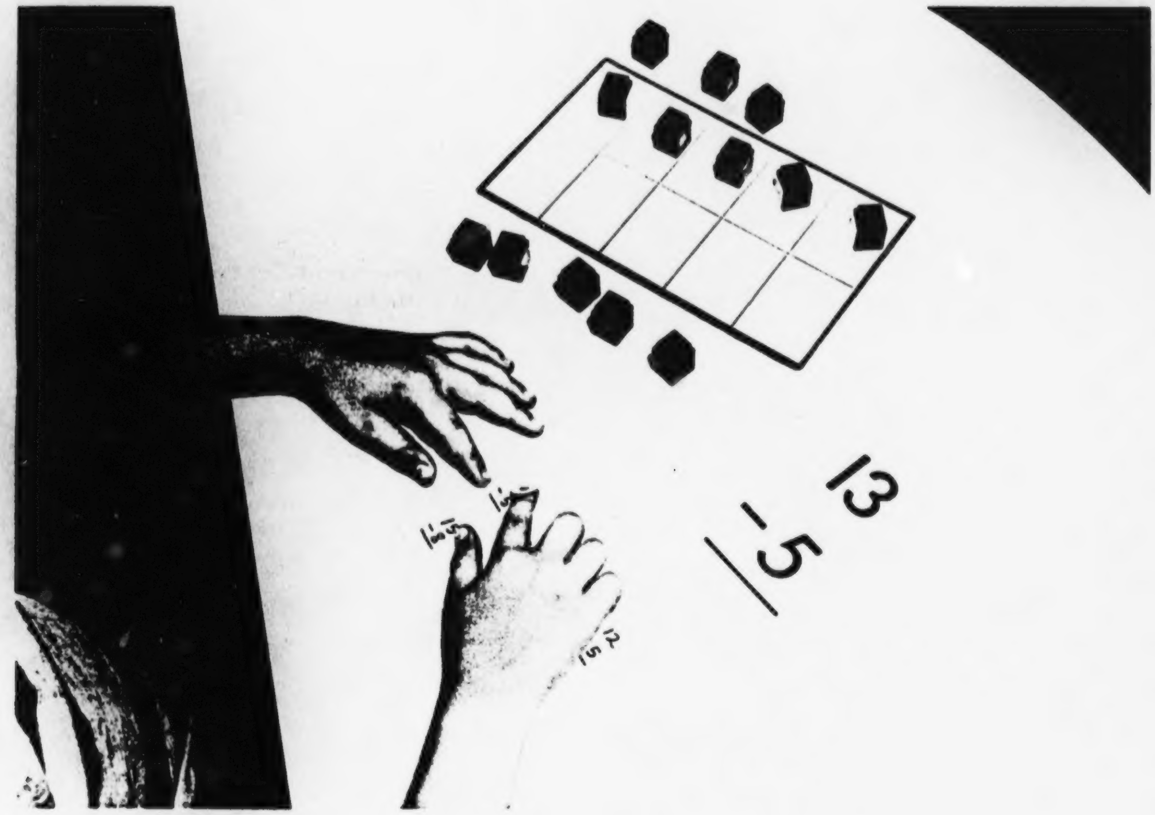
Look Hard! (Materials: Hole reinforcers (optional).) Ask students to hold up the forefinger (pointer) finger of their right hand, and to look at the fingernail. "Doesn't it look like a zero? ... Say, yes!" (Many teachers write "0" on the fingernail or put a white hole reinforcer on it.) "This is your ZERO FINGER." We'll use it to turn 'hard' subtractions into 'easy' ones."

* *Easy Does It*. (Materials: Paper and pencil.) Ask students to copy four Teen Minuend facts on their paper.

Example:	13	16	15	14
	-5	-7	-8	-6

Ask students to cover the "3" of the first problem with their zero finger. "We now have a new problem. What is it? (10 - 5) Which is? (5) and the 3 under your finger make? (13). Get students to repeat; using other facts they have written.

* Some teachers prefer to use the right thumb.

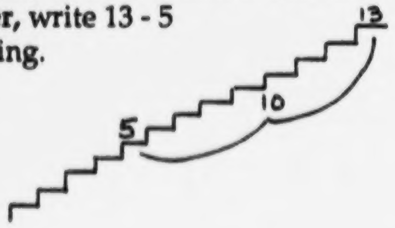


Use the Strategy

* *Your Turn*. (Materials: Individuals chalkboards.) Let students team up and take turns writing a "hard" subtraction fact on the chalkboard for their partner to solve. If the fact is unknown, suggest that students might use their zero finger to help. Circulate to check that students are using the procedure correctly.

* *10-Frame Check*. (Materials: 10-frames and small counters.) Get students to write answers then check using the 10-frame. Each time, they should "Take from 10, add extra."

* *The Fast Way Up*. Several days later, **when students become comfortable using the zero finger,** write 13 - 5 on the board, and copy the drawing. "Using the zero finger is like running up stairs. Instead of starting with the part you know and counting up by ones, you take the whole flight in two steps: Take from 10, add extras."



Choose

* *Will the Zero Finger Help?* (Materials: Subtraction flash cards, some with minuends < 10; hole reinforcer or "0" written on right forefinger of each child.) As cards are flashed, children hold up their zero finger only if the fact is a Zero Finger fact (minuend >10). Each time a Zero Finger fact appears, call on a child to answer it. (If children need to write the fact before answering, allow this.)

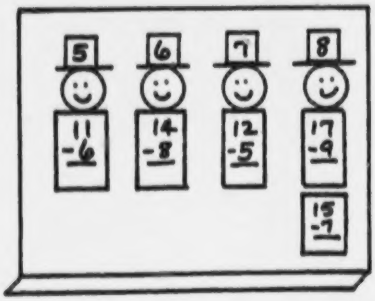
Speed Up

* *Secret Message*. (Materials: Flash cards; individual chalk-boards.) Decide on a message (e.g. "Subtraction is easy.") and write it in code on the chalk board. Ask students to copy what you write. Then flash each fact and ask students to "write b" (or some other appropriate letter) on the line above your answer.

5 13 1 11 12 14 6 8 2 10   8 3   9 12 5 4

Similarly, as you continue, instruct students to write letters above each answer to "crack the code." Library riddle books provide fun ideas for this activity. Pose the riddle and let the math help answer it.

* *Listen and Write.* (Materials: None.) When children are out of the room, write answer numbers on the chalkboard. If you have time, write them on the hat of a seasonal or happy face character. As children come into the room, tell them an answer number. Children write a subtraction fact beneath that number on the chalkboard—then sit, copy and complete as many of the board problems as possible until you decide time is up. Quickly say and write answers to the board problems so children can check their work. If you like, get a show of hands on how many students correctly answered at least 5 problems; 8 problems; . . . and so on.



Note: To keep the number of problems smaller, just give answer number to girls as they come in; to brunettes; to children wearing red; ... and vary your selection criteria day to day.

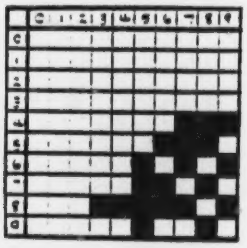
Check Up

Jiffy Quiz
Subtraction 13, 14
p. 227-228

FOCUS ON "hard" teen minend facts

11 - (7,6,5,4); 12 - (8,7,5,4);
13 - (9,8,7,6,5,4); 14 - (9,8,6,5);
15 - (9,8,7,6); 16 - (9,7); 17 - (9,8)

—any which students do not know.



When mastery is demonstrated by most students, mark these facts off the Class Cross Out list and celebrate!

When students feel confident with the Zero Finger facts, provide Add to Check, Partner and Family activities as suggested below and in their appropriate sections.

Add to Check

Use the Strategy * *Tap Happy.* (Materials: Subtraction/Add to Check flash cards envelope of 0-9 digit cards for each child.) As subtraction facts are flashed, children try to tap the answer digit before you say it. From time to time call on a child to tell the Add to Check fact. *Emphasize: When you know addition, you know subtraction too!"*

Partner Facts

Teach a Strategy * *Write and Show.* (Materials: Individual chalkboards; unifix trains; subtraction flash cards.) As cards are flashed, children answer (in unison), then write and show the partner fact for each on their chalkboards. Children use unifix train to help or occasionally check work. *Emphasize: "Same whole, same parts; good partners."*

Families of Facts

Teach a Strategy * *Pick, Write and Share.* (Materials: Individual chalkboards; unifix trains.) Write a row of Zero Finger facts on the chalkboard. Children work in pairs. One child picks a fact from the board list which both write on their chalkboards. Then, individually each child completes the family of facts, providing the answer to each. Children compare answers and give themselves a tally point if correct. Children use unifix trains to help or occasionally check work. *Emphasize: "To know one is to know all in the family."*

Rainy Day Activities

Activities like the following can reinforce number fact learning and brighten a rainy day. Many require room and space to get up and move about.

- **Twister.** (Materials: Papers or cards with facts/answers. If possible laminate these for reuse.) Taking turns, children lay the papers or cards on the floor, then get down on all fours to place:

  — one hand on fact, one on answer; one foot on a different number fact problem, the other on its answer.

  — hands and feet on four facts in a family.

  — one hand on a subtraction fact, one on its Add to Check fact; one foot on a different division problem, the other on its Add to Check fact.

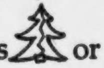
  — one hand on a subtraction fact, one on the related subtraction fact (partner--e.g. 10 - 6 and 10 - 4); one foot on a different subtraction fact, the other its partner.

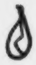
  — hands and feet on related facts and their answers (e.g. 7 + 7 = 14, so 7 + 8 = 15--one more).

  . . . and so on.

  Note: While one student twists, others could verify using counters or an answer key.

- **Match Up!** (Materials: Seasonal cutouts, as suggested below, with matching answer key.) Prepare an envelope of seasonal cutouts:

  September: apples
  October: pumpkins
  November: turkeys
  December: trees  or bells
  January: snowballs

  February: hearts
  March: shamrocks
  Easter: eggs
  April: raindrops 
  May/June: flowers

Write:

—fact on one half, answer on the other; or

—subtraction fact on one half, its Add to Check fact on the other;

—subtraction fact on one half, its partner fact on the other;

—harder addition fact on half, an easier helper fact on the other (e.g. 7 + 8 = 15, 7 + 7 = 14).

. . . and so on.

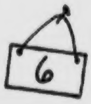
Cut the shapes in half (puzzle style) and distribute them. Children find their "match" and check with a key or calculator as is necessary.

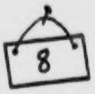
Mix the cards and repeat as time allows.

- **Seek and Find!** Use any set of matching fact-answer cards. Play as in Match-Up, but tape or pin cards to children's backs.

- **Snatch a Frog.** *Idea shared by Marge Anderson.* (Materials: stuffed frog, masking tape, flashcards, answer, cards on string which children can wear around their necks -- identical cards for each team.) Divide the class into two teams lined up opposite and facing each other several feet apart, depending on space available. (If the class is large, have two sets of two teams.) Use masking tape to mark the boundary for each team. A frog or other stuffed animal should be placed in the middle between the two teams.

  Distribute the answer cards to members of one team. Distribute a duplicate set to the other team(s). Then, as you show and say each number fact flash card, children on opposing teams wearing the answer card race to "snatch the frog" and win a point for the team.

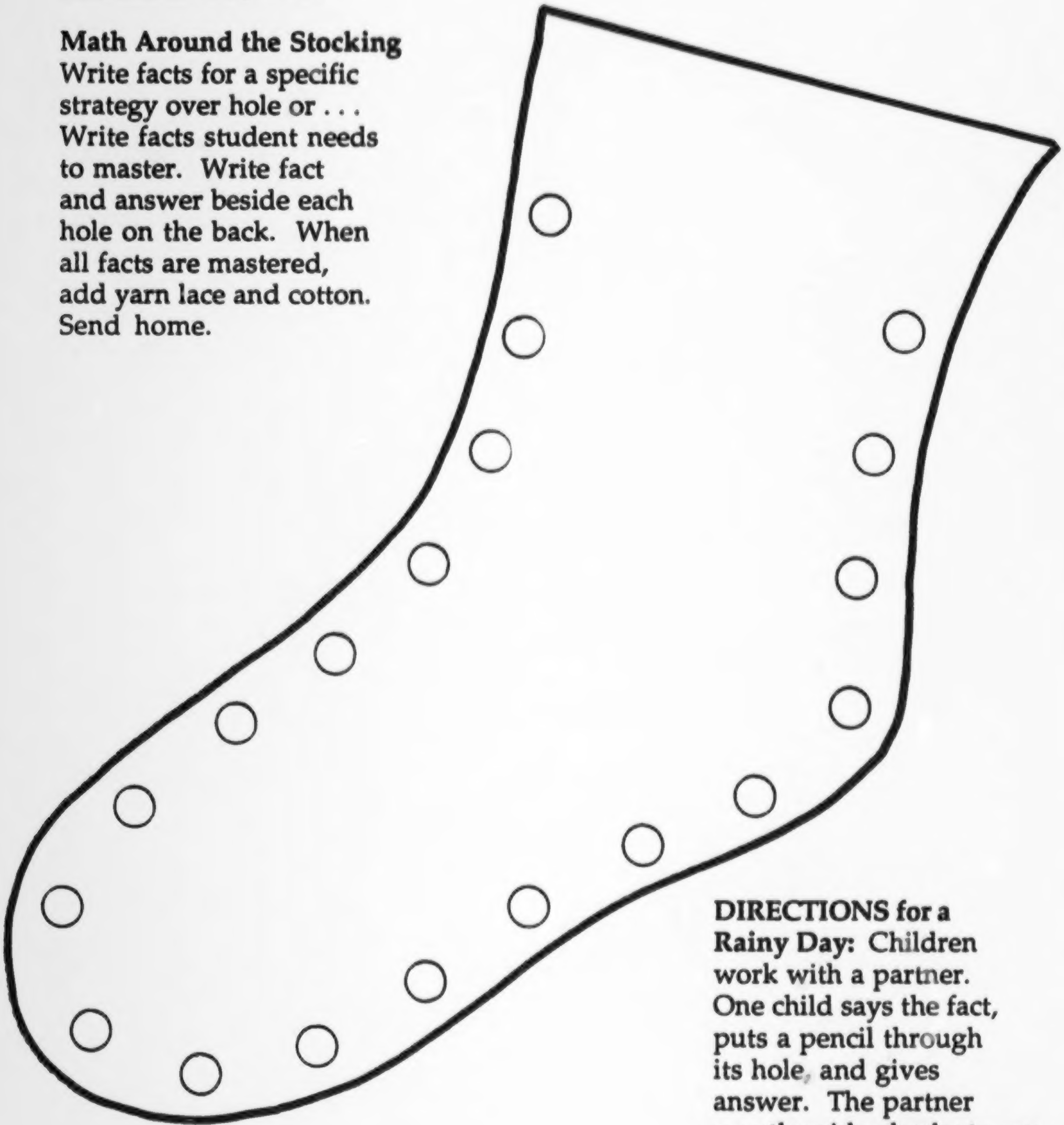




- **Don't Peek! --Peek!** (Materials: Fact cards with no answers.) Children may stand anywhere in the room. Write answers to the fact cards in sequential order on the chalkboard (space out generously!), and distribute the cards, face down to children. Remind them: "Don't peek until I say so." When all cards are distributed, call "Peek!" as the signal for children to look at their card and stand by its answer written on the chalkboard. Check by asking students to hold up cards for you to see. Then mix the cards and repeat as time allows.

A Christmas Special:

Math Around the Stocking
Write facts for a specific strategy over hole or . . . Write facts student needs to master. Write fact and answer beside each hole on the back. When all facts are mastered, add yarn lace and cotton. Send home.



DIRECTIONS for a Rainy Day: Children work with a partner. One child says the fact, puts a pencil through its hole, and gives answer. The partner on otherside checks to see if correct. Children take turns "mathing" around the stocking.

*Idea contributed by Ann Stewart

Active Learning Bulletin Board Activities

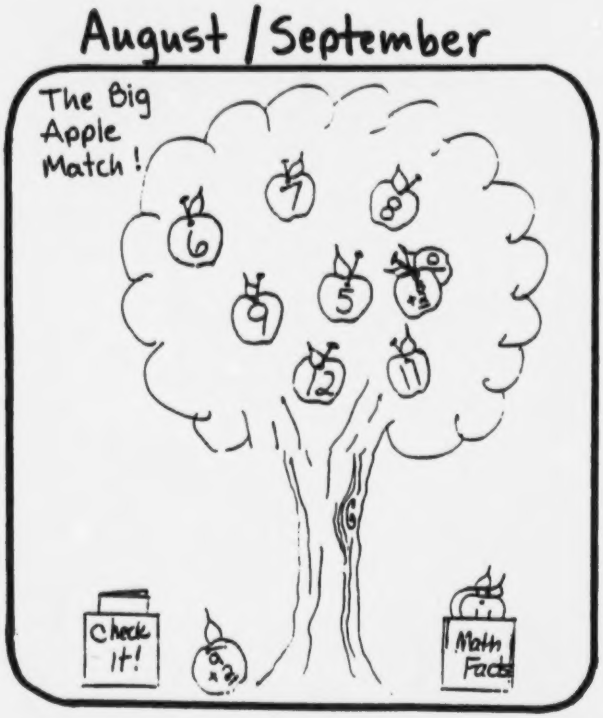
This section contains sketches of active learning bulletin boards for basic facts. For each month of the school year, a sample bulletin board idea is given. Each time, one sample activity for using the bulletin board in an active learning setting with students also is given. The ideas that are presented include suggestions for:

- whole class activities;
- partner activities;
- individual activities.

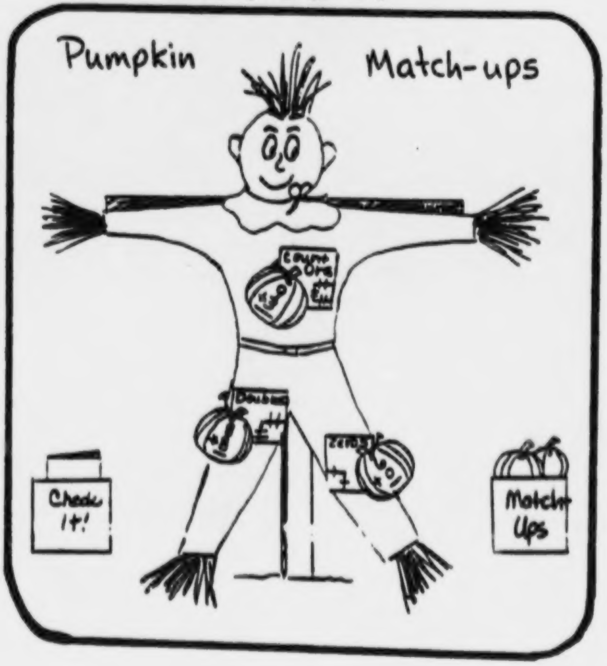
Sometimes the focus of the activity is on selecting helpful hints or strategies for learning certain number facts. Other times the focus is to review or practice facts. Ideas presented for one month, of course, can and should be adapted and used in other months.

A suggestion:

Two children work together. One matches fact (hooks card over pin on board) to answer while the other checks. "Rotten apples" (facts with wrong answers) are hooked over pins near the bottom of the board. When all apples are taken from the pocket, the child matching has one last chance to get apples from the ground onto the tree (answer the facts correctly), then counts total apples placed on the tree. Children reverse roles.
Goal: Get all apples onto the tree.



October

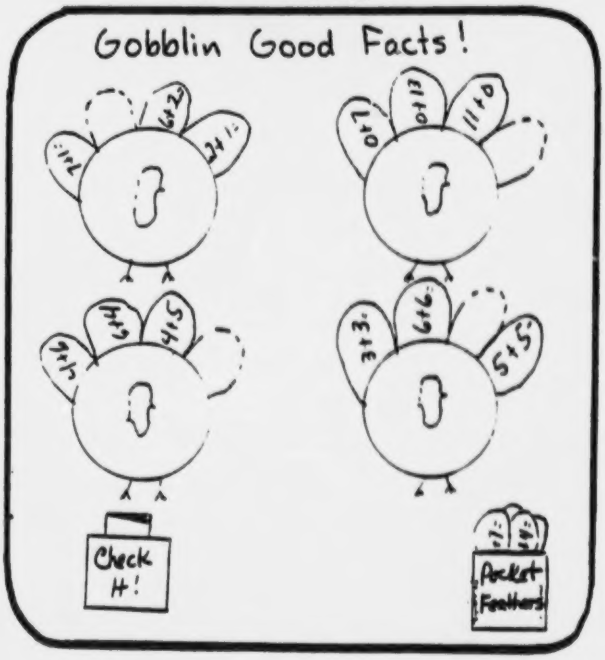

Pumpkin
Match-ups
Check It!
Match Ups

A suggestion:

Child works independently to sort pumpkin match-ups by strategy, answering each fact quietly while working. If necessary, the child checks an answer against the key provided. The child then selects a partner, and answers each fact as it is replaced in the "Match Ups" pocket. The partner checks, keeping any facts answered incorrect to the end—when a "second chance" is given.

Goal: Answer all facts correctly.

November

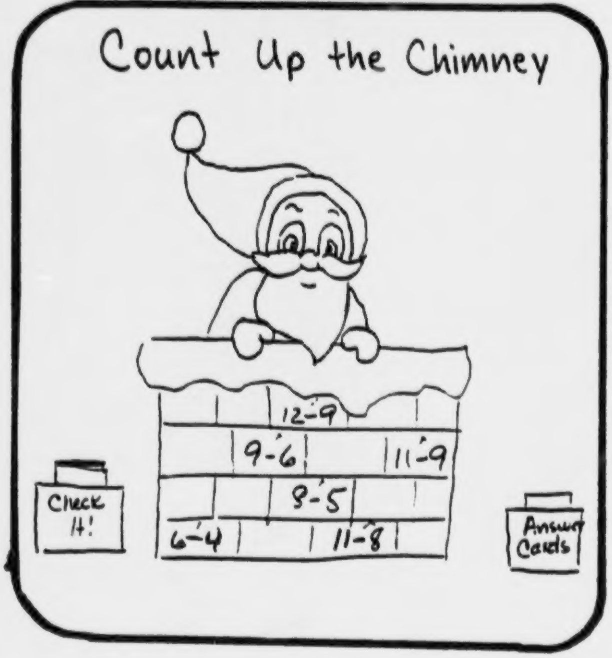

Gobblin Good Facts!
6+2
2+1
7+0
11+0
3+3
6+6
5+5
Check It!
Pocket Feathers

A suggestion:

In turn, each child works independently to sort pumpkin match-ups and answer facts (as in October). As children leave the room for lunch, (gym, music, recess, ...) the teacher uses the pocket feathers as flash cards for individuals to answer as they leave the room.

Goal: Get even the "hard ones" that teacher may ask. RIGHT the first time around!

December

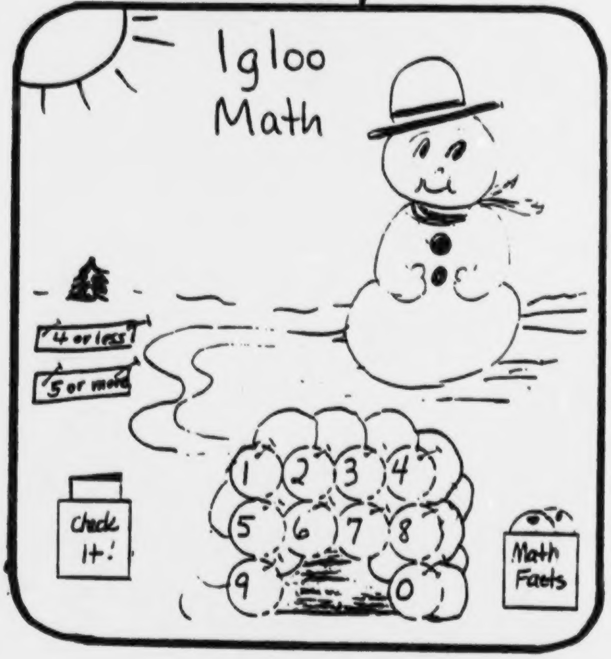

Count Up the Chimney
12-9
9-6
11-9
8-5
6-4
11-8
Check It!
Answer Cards

A suggestion:

Working together, two children match answer cards to the Count Up facts, and return them to the "Answer Cards" pocket as they check each one.

Goal: To count up the chimney with Santa.

January

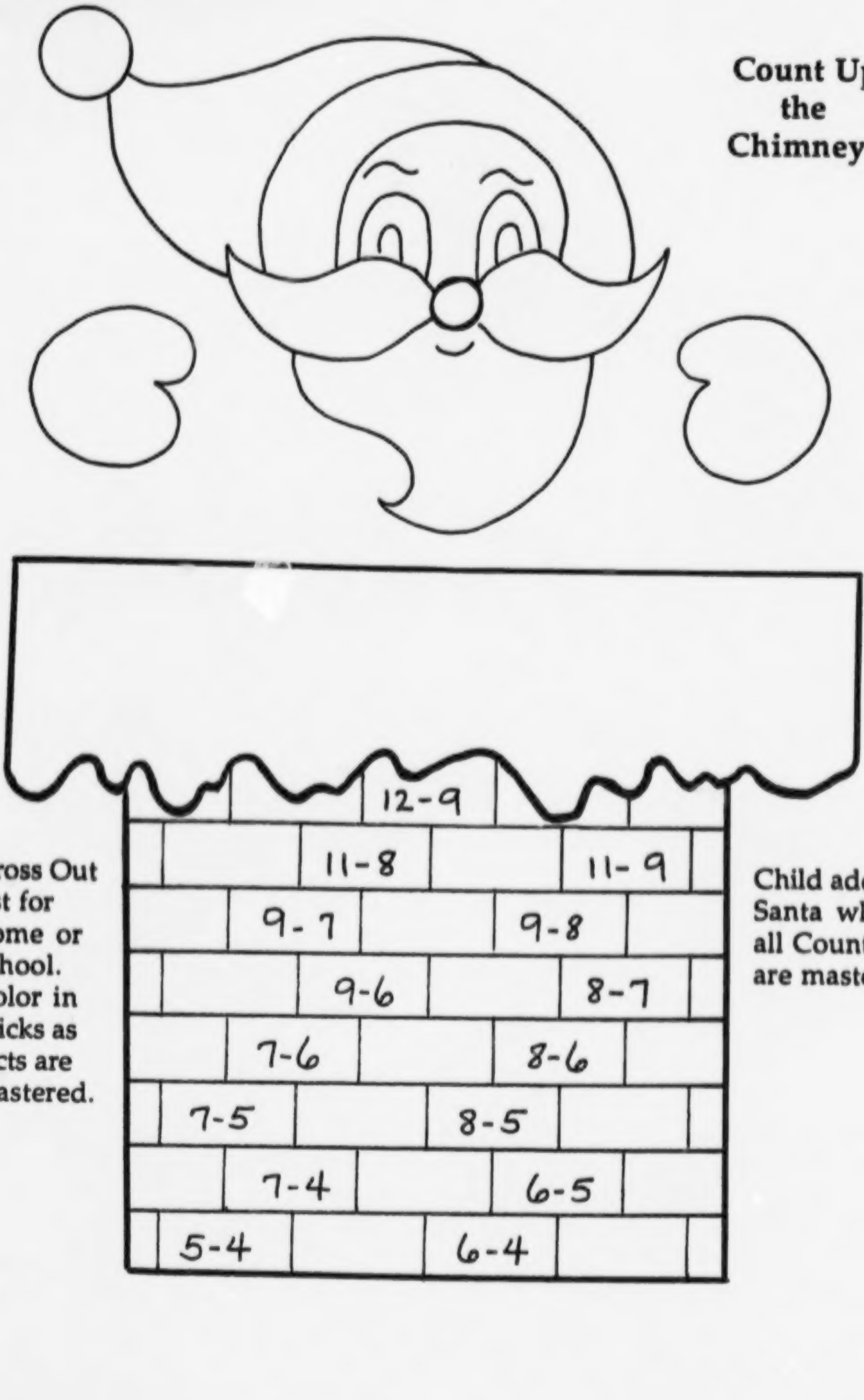

Igloo Math
4 or less
5 or more
1
2
3
4
5
6
7
8
9
0
Check It!
Math Facts

A suggestion:

Working together, two children sort facts by answer: 4 or less; 5 or more. They next check the sort using the key provided. Then one child takes the "4 or less" pile; the other the "5 or more" pile. They place each fact over the pin by its answer, and check each other's work.

Goal: Answer all facts correctly.

Count Up the Chimney*


12-9
11-8
11-9
9-7
9-8
9-6
8-7
7-6
8-6
7-5
8-5
7-4
6-5
5-4
6-4

Cross Out list for home or school. Color in bricks as facts are mastered.

Child adds Santa when all Count Ups are mastered.

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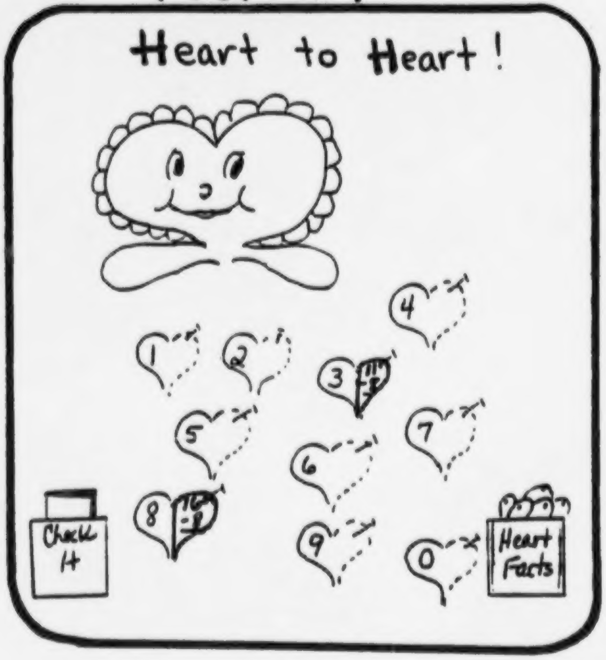
*Idea contributed by Ann Stewart.

February


Heart to Heart!
1
2
3
4
5
6
7
8
9
0
Check It
Heart Facts

A suggestion:

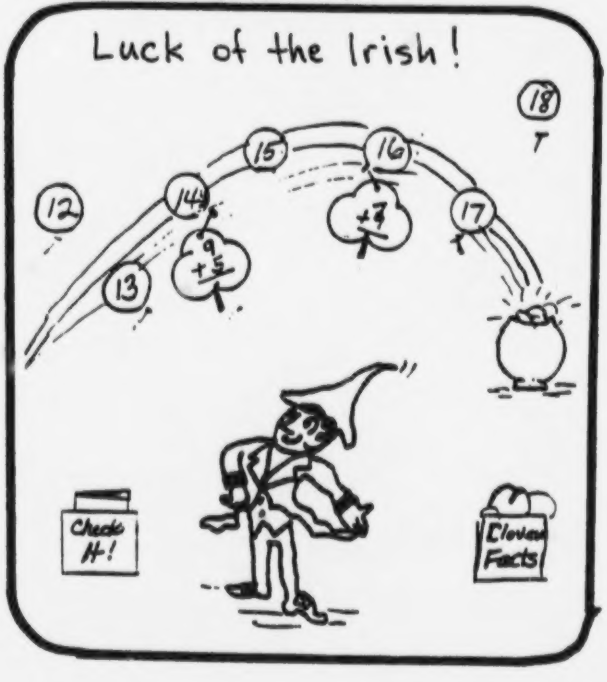
Children work independently to match heart problems to heart answers. Once done, a partner is selected to check each match. Heart facts which "check" are returned to the pocket, others are saved to the end, when a second chance is given. The checker gets the next Heart to Heart match-up turn at the bulletin board.

Goal: Answer all facts correctly without peeking at the key.

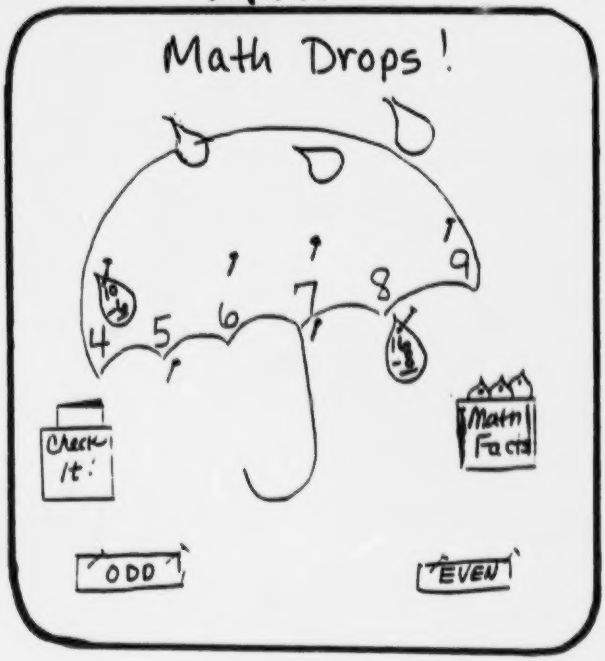
March

A suggestion:

Children work independently or with a partner to match facts to answers. If a timer is available, they try to complete the matching before the alarm sounds. It's all right to have a few practice rounds before setting the timer. A rotating system might be established so that, within the week, all have a turn.


Luck of the Irish!
12
13
14
15
16
17
18
9
+5
+7
Check It!
Clover Facts

April

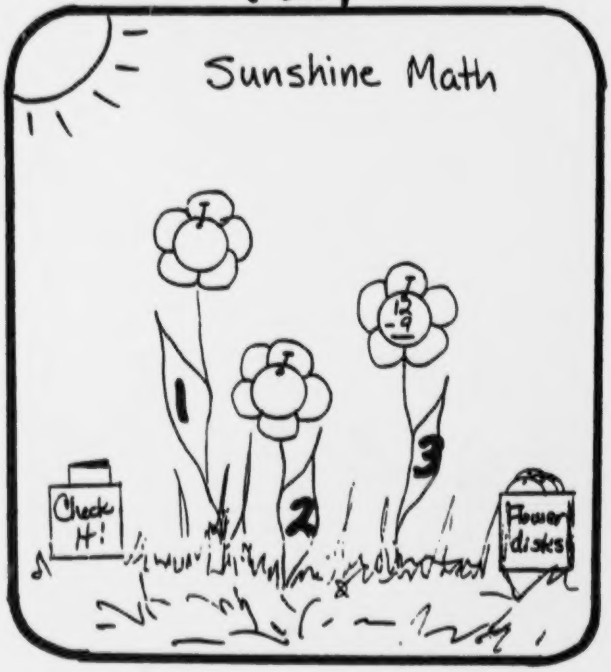

Math Drops!
4
5
6
7
8
9
Check It!
Math Facts
ODD
EVEN

A suggestion:

Working together, two children sort facts by answering even/odd, and check the sort using the key provided. Then one child takes the "even" pile, the other the "odd". Then place each fact over the pin by its answer, and check each other's work.

Goal: Answer all facts correctly.

May


Sunshine Math
1
2
3
Check It!
Flower disks

A suggestion:

Working together, two children match center flower disk (fact cards) to flower with correct answer leaf. As each is checked, the flower disk is returned to the pocket.

Goal: Answer all facts correctly.

Extensions of Basic Facts

As occasions arise, capitalizing upon certain natural extensions of number fact work can reinforce concept understanding for an operation, help children develop a better sense of number, and nurture their ability to "think mathematically." Sample ideas for carrying out work of this type are given below. Activity like that suggested contributes to broader goals in mathematics, for it frequently engages students in special types of "problem solving" situations that stimulate them to be flexible in their thinking about number.

Traditionally we may have thought of doing activities of the type suggested only with talented youngsters, who relish and are good at doing them. But every child has untapped potential which may be spurred by participating regularly in more exciting and challenging aspects of mathematics.

Extensions Related to Decision Making

- **What's the sign?**

$$\begin{array}{rr|rr} 8 & 8 & 5 & 5 \\ \underline{2} & \underline{2} & \underline{3} & \underline{3} \\ 10 & 6 & 2 & 8 \end{array}$$

- **Does the turnaround give the same answer?** (Help children generalize that addition turnarounds do; subtraction turnarounds do not.)

  Hold thumbs up if the turnarounds give the same answer:

  6 + 4 and 4 + 6; 8 - 4 and 4 - 8 . . .

  Note: Refrain from stating that subtraction turnarounds "don't work"; or that you "can't do" problems like 4 - 8. In later grades children will study integers, where an answer to problems like this clearly CAN be determined. Rather, emphasize that "subtraction turnarounds do not give the same answer."

Use money to illustrate that 6¢ + 4¢ is the same amount of money as 4¢ + 6¢. But 6¢ - 4¢ (having 6¢ and paying back 4¢ to someone) is a very different situation from 4¢ - 6¢ (having 4¢ and having to pay back 6¢. You'd not be 2¢ ahead. Instead, you'd still owe 2¢!)

- **What Size Family?** Get children to think about and identify which facts have four-member "families" and which have less. How many less? (Doubles have two-member families.)

- **When do Patterns Help?** Get children to think about and identify those facts that involve number patterns? (Help them generalize that 9s in both addition and subtraction involve special number patterns. Later, this generalization will extend to multiplication and division.)

- **When do Pictures Help?** Get children to think about and identify those facts that involve picture clues. (Help them generalize that Doubles, Doubles + 1 and 10-Frame facts in both addition and subtraction involve visual clues. Later, children will extend the use of doubles pictures to multiplication and division 2s.)

Extensions Related to Patterning

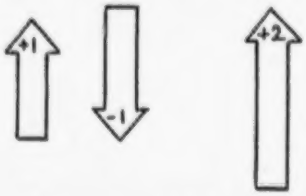
- **Flash and Write**. (Materials: Flash cards for facts currently being included in SPEED UP activities.) As you flash a set of cards, have children copy just the answers on paper. Ask children to raise their hands as soon as they note a pattern in the answers. For example: sequential odds; sequential evens; 7,8,7,8 ...; 2,2,3,3,2,2,3,3, ...; all answers ending in 8, 9 or 10; and so on.

Extensions Related to Mental Math

Note: Many of the following ideas were written in collaboration with Diana Behnke who, over the past year, has used them in daily 5 to 8 minute Mini Math sessions with her first grade class.

- **Arrow Math** (Materials: Individual chalkboards.)

  Draw the following arrows on the chalkboard.



  Take your slates. Put 14 in your head (write on the chalkboard).
  Do what I point to in your head. Ready?
  — 14 (*point to:* +1, +2, -1). WRITE and SHOW your answer. (16)
  How did you get 16? (Let a child talk it through.)
  — Let's try another. Put 12 in your head (write it on the chalkboard and *point to:* +1, +2, +1). WRITE and SHOW your answer. (16)
  How did you get 16? (Let a child talk it through.)
  — Try this one. Put 15 in your head (write it on the chalkboard and *point to:* +2, -1, +2, +1). WRITE and SHOW your answer. (19)
  How did you get 19? (Let a child talk it through.)
  Continue, as time allows.
  Note: At a later time, also add a -2 arrow.

- **Star Number Activity.** (Materials: Flash cards for addition Count Ons, Zeros, Doubles and Easy 10-Frame Facts.)

  Stand up. Let's play STAR NUMBER today. 10 is my "star number." *(Write 10 inside a star on the chalkboard.)* When I show a card, I want you to stoop low if the answer is less than 10; stand tall if the answer is more than 10. If the answer is 10, clap your hands.* Ready? (*Show the first card. After students signal their response each time, call on one student for the answer and provide feedback relating to more/less.* For 9 + 3, for example, when a child answers 12, say: "Good, you stood." 12 is more than 9.)

- **I'm Thinking of a Number**. (Materials: Envelope of cards, 0-20. Children lay these out in two COLUMNS, 0-10 along the left edge of the desk; 11-20 along the right edge.)

  I'm thinking of a number. I'll give you clues. Hold up the number when you know it. Listen.

* * *

I say it when I count by 2s. *Move these cards to the center of your desk.**
It's more than 8. *Push back cards you don't need.*
It's less than 16. *Push back cards you don't need.*
I say it when I count by 10s. What's my number? (10)

* Moving cards models the thinking needed to mentally sort out the numbers and may be useful to some students. Encourage it or not, as you wish for all/some students.

* * *

Guess this number.
It's between 9 and 16. *Move these cards to the center of your desk.*
It's a greater number than any you see on your inch ruler. *Push back cards you don't need.*
If I switched places with the digits I'd have 31. What's my number? (13)

* * *

Guess this number.
I say it when I count by 5s. *Move these cards to the center of your desk.*
It's between 11 and 19. What's my number? (15)

* * *

Guess this number.
It's between 2 and 11. *Move these cards to the center of your desk.*
It's the answer to an addition double. *Push back cards you don't need.*
It's the o'clock time, 4 hours before noon. What's my number? (8)

* * *

Guess this number.
I don't say it when I count by 2s. *Move these cards to the center of your desk.**
It's more than 8. *Push back cards you don't need.*
It's less than17. *Push back cards you don't need.*

I say it when I count by 5s. *Push back cards you don't need.*
It's three less than 9 + 9. What's my number? (15)

Continue, as time allows.

- **Add Big in Your Head.** (Materials: Unifix cubes: Trains of 10.) *Write the following problem pairs on the board. Write in answers as students give them. Retain the board list.*

  2 + 2 = (4), so 20 + 20 = (40). (In pairs, let students count trains of unifix cubes to check 20 + 20.)

  4 + 4 = (8), so 40 + 40 = (80). (In pairs, let students count trains of unifix cubes to check 40 + 40.)

  1 + 1 = (2), so 10 + 10 = (20). (In pairs, let students count trains of unifix cubes to check 10 + 10.)

  3 + 3 = (6), so 30 + 30 = (60). (In pairs, let students count trains of unifix cubes to check 30 + 30.)

  5 + 5 = (10), so 50 + 50 = (100). (In pairs, let students count trains of unifix cubes to check 50 + 50.)

- **10 and More.** (Materials: 10-Frame for teacher, an overhead [and 19 counters] or drawn on chalkboard; envelope of cards, 0-20. Children lay these out in rows across desk top.)

  If I fill the 10-Frame, "How many dots/counters are needed?" (10) ...and these four make ______ in all. *(14) Write 10 + 4 = 14 as the first equation in a board list.* Think about the 10-frame and hold up the answer to each of these. (Write each equation on the board, with answer, as it is given by students. Retain the board list.)

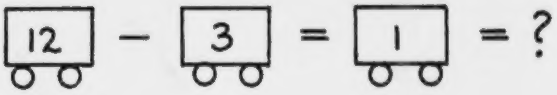
  10 + 6 = (16)   10 + 8 = (16)   10 + 3 = (13)
  10 + 9 = (19)   10 + 2 = (12)   10 + 7 = (17)

  Is there a pattern in these problems? (Yes, the answer is just one ten and 7 (or whatever digit is in the one's place; OR the answer ends with the same digit you're adding to 10.)

- **Train Math Activity.** (Materials: Envelope of cards, 0-20. Children lay these out in two rows across desk top.)

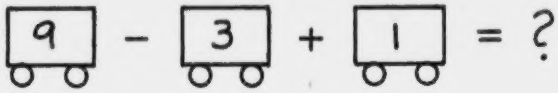
In each "train" of three or four cars include any of the following [subtraction first]: Count Back, subtraction Zero, +0, +1, first, then add 1, 0, 1, 2 or 3 with an addition double, 10 sum or 5 + 4 as addends.

"Let's play Train Math today. Hold up the answer card for 12 - 3 + 1." (10)



Note: The standard assumption agreed upon by mathematicians when mixed operations are involved is to add first then subtract. The exception is instances like this in which the "house" (brackets) suggest subtracting first.

Hold up the answer card for 9 - 3 + 1. (7)



From now on I won't write. Just listen to the numbers and add or subtract in the order I give them. (If it seems helpful, ask children to repeat the numbers to be added before they show the answer.)

- 11 - 3 + 1 (9); 9 - 2 - 0 + 1 (8); 12 - 0 - 3 + 0 (9);
- 8 - 5 + 1 (4); 7 - 0 - 5 (2); 10 - 3 - 0 + 1 (8);
- 11 - 0 - 2 (9); 10 - 2 + 1 (9); 9 - 0 - 3 + 0 (6).

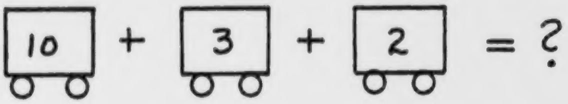
Continue, as time allows.

Note: Easier, one operation trains of addition and later of subtraction facts would be used prior to this activity.

- **Train Math Activity: 10 and More.** (Materials: Envelope of cards, 0-20. Children lay these out in rows across desk top.)

  In each "train" of three or four cars, start with 10 + a 1-digit number, then add (in any order) 0, 1 or 2.

  Let's play Train Math today. Hold up the answer cards for 10 + 3 + 2. (15)



  What did you add first? (Though it doesn't affect the sum, it's easier to start with 10.)

  Note: Previous work with **10 and more** is a prerequisite for this activity.

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*Previous work with 10 and more is a prerequisite for this activity.

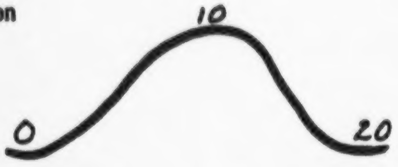
- **The "1" or the "20" Side of the Hill?** (Materials: Three scraps of paper for each child; addition flash cards.)

— Write 0 on one paper scrap and 20 on another. Save the other scrap for later. Now hide 0 in the left hand, 20 in your right.

— Stand up! Put your left hand at your side. Play rubberman. Touch your left hand with your right hand; then move your right hand up your left arm, all the way up over your head and down your right arm as far as you can go.

— If you just touched all the numbers between 1 and 20 what number is on top of your head? (If it seems helpful draw a 20 inch/cm line on paper and fold it in half.)

— I'll draw the hill you just made with your hand and write on top. *Write 10 on your other paper scrap and put it on top of your head.*

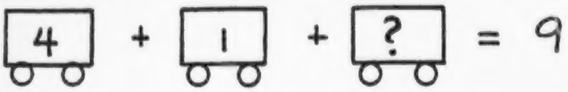


— This is our giant snow hill. You're one, too! Until you climb to the top of the hill/your head, it's easy to slide back to 0. Once at the top or beyond, you're close to 20 and can slide down!

— I'm going to flash addition facts. As I do, I want you to raise your left hand if the answer is on the left side of the hill and raise your right hand if the answer is on the right side of the hill. Ready? (...each time, after children signal, call on one child to provide the correct answer.)

Note: At a later session, also have children put both hands on top of their head if the answer is 10.

- **What Do We Need?** (Draw train cars on the board.) We are missing one number on this train. What do we need? (4)



Repeat. Provide car number like:

5, 3,☐= 11 **[need 3]**;
9, 0,☐= 12 **[need 3]**;
2, 8,☐= 11 **[need 1]**;
4, 2,☐= 8 **[need 2]**;
3, 4,☐= 9 **[need 2]**.

- **More or Less?** (Materials: Popcorn grains, beans or other small counters, 18 for each pair of students. These could be stored in an envelope and collected or stored in students' desks for reuse at a later time.)

Listen and hold thumbs up for more; thumbs down for less. Ready?

— What's 6 + 6? (12) So is 6 + 9 more or less? (More: Thumbs up.) *One student in each pair should put 6 counters in each hand. Does your partner have to give more so you have 6 and 9? (Yes)* Circle the second addend of each equation and note that 9 is more than 6.

— What's 8 + 8? (16) So is 8 + 4 more or less? (Less: Thumbs down.) *One student in each pair should put 6 counters in each hand. Does your partner have to give more so you have 8 and 4? (No, the partner has to take some away so I have less.)* Circle the second addend of each equation and note that 4 is less than 8.

— What's 5 + 5? (10) So is 5 + 9 more or less? (More: Thumbs up.) *One student in each pair should put 5 counters in each hand. Does your partner have to give more so you have 5 and 9? (Yes)* Circle the second addend of each equation and note that 9 is more than 5.

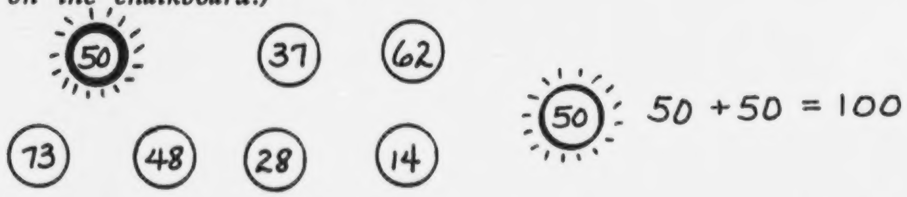
Continue, as time allows. Start with an easy, known addition fact: a Double, Count On, Zero or Easy 10-Frame fact.

Note: At a different session, review the above and add:

— Think about these. What's 50 + 50 *(write it on the board)?* What about these? Put thumbs up for more, thumbs down for less. *(Write each on the board.):*

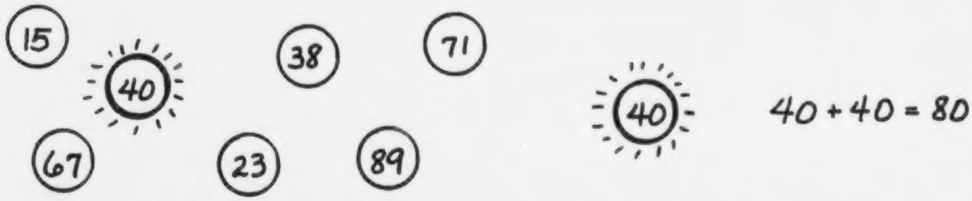
50 + 35 (less); 50 + 72 (more); 25 + 50 (less); 75 + 50 (more).

- **More or Less? -- A Quick Guess Activity.** *(Draw the following circles on the chalkboard.)*



What's 50 + 50? *(Point to these two numbers.)* Put thumbs up if the sum is more, thumbs down if it's less when I point to two different numbers. (50 + 37; 50 + 62; 50 + 28; ... 28 + 37)

(If time allows, erase and draw the following circles on the chalkboard.)



What's 40 + 40? *(Point to these two numbers.)* Put thumbs up if the sum is more, thumbs down if it's less when I point to two different numbers. (40 + 38; 40 + 67; 40 + 23: ... 23 + 38)

- **Cover!** Extend the Speed Up activity in the 10-Frame Fact lesson. Think of the answer. Tell the number that's more than the answer, or the number that's 2 less ... (Apply to addition as well as subtraction; or include a mix of addition-subtraction problems.)

- **Star Number Activity**

Stand up. Let's play STAR NUMBER today. 10 is my "star number" (Write 10 inside a star on the chalkboard.) Listen; I'll tell a short story. I want you to stoop low if the answer is less than 10; stand still if the answer is more than 10. If the answer is 10, clap your hands. Ready?

— (Name of child in the class) ate 5 cookies for snack; (Name of different child) ate 4. Together, how many did they eat?

After students signal their response each time, call on one student for the answer and provide feedback relating to more/less/equal. For 5 + 4, for example, when a child answers 10, say: "Good, you stooped. 9 is less than 10."

Continue with problems such as:

— (Name of child in the class) studied math facts for 4 minutes. (Name of different child) studied for 6 minutes. Together, how long did they study?

— (Name of child in the class) mom baked 12 giant chocolate chip cookies. (Name of different child) came over to play and ate 3. How many cookies were not eaten?

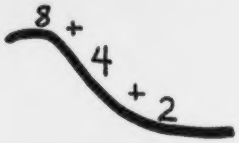
— (Name of child in the class) got 9 words correct on the spelling test. (Name of different child) also spelled 9 correct words. Together, how many words did they spell correctly?

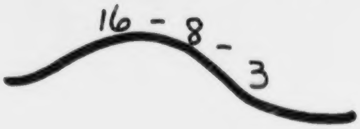
— (Name of child in the class) went to the city library and checked out 7 books. (Name of different child) checked out 10 books. Together, how many books did they check out?

— (Name of child in the class) walked 6 blocks to get a little exercise. (Name of different child) just had time to walk 3. Together, how many blocks did they walk?

— (Name of child in the class) had 11 stamps from England and gave 2 of them to (Name of different child). How many English stamps did (Name of first child) have then?

- **Shoestring Math.** (Materials: Individual slates.) Ask children to WRITE and SHOW answers to problems like the following.





Note: Watch order of operations. Refer to comments in the Train Math activity, earlier in this section.

- **Estimate: "How Long Will the Chain Be?"** (Materials: Construction paper strips, seasonal colors [each long enough to be glued and made part of a paper "chain"]; glue; flash cards for "hard" facts.) When children are out of the room, place the flash cards along the chalk ledge. When children enter, distribute four strips of construction paper to each child and have them copy, one to a strip, four of the "hardest" facts they can think of (can be different from those you've chosen). As you pass students' desks during the day, quietly ask them to give the answer to one of the facts. "Correct" facts are added to the class chain (which, when long enough, can be strung in various ways to decorate the classroom).

When children get the idea of what is happening, pause a moment to get them to think and estimate how long they think the chain will be by the end of the week. ... At the end of the week, pause again to ask: "Did the chain get as long as you thought?"

Modifying Activities to Meet Learning Needs of Individual Children

Ideas drawn from the work and perspective of a specialist:
Margaret A. Toohey[*]

Children with learning difficulties and specific learning disabilities have unique learning styles consisting of both strengths and weaknesses. If these students are to acquire mastery of the basic facts, a match between instruction and learning style which accounts for weaknesses but capitalizes on learning strengths is necessary. The following guidelines and suggestions involve specific procedures which allow teachers to advantageously use the learning strengths of children. In general, it is helpful to:

- Have the children try to verbalize how they remember facts.
- Build on to these strategies or help children modify them if necessary.
- Where children are unable to verbalize strategies or do not appear to have developed adequate strategies, help them to select those best suited to their needs and modify where necessary. Remember to consider both learning strengths and weaknesses when selecting and/or modifying strategies.

It is important to be atuned to students' strengths as well as learning weaknesses when selecting or modifying strategies for learning the facts. The following ideas may prove helpful in this regard. Three modalities—auditory, visual, and kinesthetic/tactile—are addressed, as well as several specific difficulties that some students have.

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[*] Margaret A. Toohey is Math Coordinator, Division of Special Education, Queensland, Australia.

Dealing with Auditory Learners

1. Precede all actions and demonstrations with spoken instructions. Each step may comprise two parts:
   - Oral instructions only.
   - Oral instructions closely followed by visual stimulus, concrete manipulation or demonstration.
2. Provide a verbal summary of each step.
3. Use key words to focus the child's attention, if necessary.
4. Remove extraneous visual stimuli.

Auditory emphasis may be provided through:

- **Verbal prompts.** Develop in each sample lesson and modify to meet an individual's needs.

- **Close.** In reviewing a strategy, orally prompt children's responses for unknown facts. Example: "12 - 6 is an easy double. 12 - 6 is the dozen fact. 12 - 6 is . . . (6)." Now follow with: "12 - 6 is an easy double . . . that's the . . (dozen fact). 12 - 6 equals . . . (6)."

- **Verbalizing with the child.** Sit by children as they complete a worksheet of facts. This worksheet should contain many known facts but repeatedly present the one or two troublesome facts on which you are working. Children work through the sheet. When the difficult fact is encountered, children say the fact aloud with the teacher. The teacher should take care to speak clearly into the childrens' dominant ear.

- **Use of tape recorder or Language Master.** Let children select facts which they find difficult and for which they need concrete aids. Let children listen to the tape and say the facts with the tape. Initially, the fact problem, a strategy hint and answer are provided. Over time the hint and later the answer are deleted. Pauses are inserted so students can supply the hint or answer.

- **Verbal hints.** Stress the verbal prompt provided under the title in each of the sample lessons.

- **Oral Patterning.** After strategies have been developed, ask children to identify the strategy for a particular set of facts. Refer to sets of facts by "name": Picture 2s, Clock 5, Pattern 9s, and so on.

- **Use of Rhymes.** For children who have strengths in the area of language, rhymes can be used after the strategies are understood to help them recall the appropriate strategy. The following by Moira Cochrane, a teacher from the Queensland, Australia, Division of Special Education, are included. The teacher and children together may develop others to suit individual needs.

FUNFAX Songs: Addition and Subtraction

(based on the Basic Fact Funfax Program written by
Carol A. Thornton and Margaret A. Toohey for
Creative Publications, P. O. Box 10328,
Palo Alto, CA 94303; Lyrics and
words to songs written by
Molra Cochrane)

1. COUNT ONS

Count-ons, count-ons,
Now how do I do those?
I add on one, or two, or three
And so my answer grows.

It's easy if I take my time
I'll tell you how I do it
Four plus three - goes five, six, seven.
See! There's nothing to it.

First I take the bigger number
Then count the small one on,
It can be one or two or three
I count on till it's gone.

2. ZERO

A zero is a friendly thing,
It's round and plump and squat,
But added on or turned around,
It doesn't mean a lot.

Add zero to a six or eight
You still have six or eight
But when a zero is in ten,
That's when it carries weight.

3. TURNAROUNDS

Turnarounds, turnarounds,
Are easy to do,
For when you have one answer
Then really you have two.

For three plus seven turned around,
Must be seven plus three,
The answer is the same both times,
And that's a help to me.

4. DOUBLES

Doubles, doubles,
Sounds a funny name,
But that helps me remember,
Both numbers are the same.

One plus one, or nine plus nine
When the numbers match
That's called adding doubles,
It's simple - there's no catch.

5. THE DOUBLES SONG

One plus one - twins in a pram
Two sticky sisters eating jam

Two plus two - wheels on a car
Four spinning things to take me far.

Three plus three - stumps for cricket
Six little sticks stuck in a wicket

Four plus four - spread beside her
Eight hairy legs on Missus Spider

Five plus five - when your hands meet
Ten fingers clutching a pie to eat

Six plus six - side by side
Twelve brown eggs - six boiled, six fried

Seven plus seven - now get it right
Fourteen days or one fortnight

Eight plus eight two octopuses meet
Sixteen arms but no wet feet

Nine plus nine - the T.V. number
Eighteen dots when two nines rhumba.

6. NEAR DOUBLES

Near doubles, near doubles
Now stop and use you head
We know doubles, they're okay
But that's not what it said.

It nearly is the same - not quite
Think doubles as a guide
Then slowly count on carefully
Those extras on one side.

Four plus five - think four plus four
Then to that answer add
One more to make it four plus five
You follow me? I'm glad.

Sometimes you have to add on two
Think doubles as before
Then to that answer count on two
You'll love them and want more!!

7. NEAR TEN

Near ten, near ten -
Means ten will help me count,
When I have nine and six to add
To get the right amount.

I go to ten, then add the rest,
Do you see what I mean?
Nine plus one, that makes the ten,
Then five more makes fifteen.

8. ADDITIONS AND SUBTRACTIONS

I can do additions,
And not get in a stew,
Count-ons - Doubles - Turnarounds
Are not so bad to do.

I use the rules to help me,
I try to concentrate,
But if additions disappeared,
Wow! How I'd celebrate.

Now I've done addition,
And learnt to plus a plus,
I can tackle subtraction,
Without a lot of fuss.

Part and part make the whole,
Whole take part, leaves part,
If I can just remember that,
I'll make a flying start.

9. ZERO SUBTRACTIONS

Take zero from the whole
And the whole won't turn a hair,
The whole will just remain complete
And keep on being there.

Take the whole from whole
And then the page looks bare,
With just the zero left behind
For the whole's no longer there.

10. COUNTING TO SUBTRACT

When the number you take is more than three,
Count on.
When the number you take is three or less,
Count back.
Look at the problem you have to do,
Remember the hint I've just told you.
You'll find it works once you've done a few
And maybe you'll grow to enjoy them too!!

11. FAMILIES

I've a family of mice
In a wire cage downstairs
Light twitchy, whiskered mice
With shiny, silky hairs,

I've a family of facts
Inside a homework book
Not so different from my mice
When I stop to take a look.

For this family of facts
With parts of five and three
And up to eight—same number as
My cute, mice family.

Partners are the part I take
Turnarounds the parts I add,
And pairs are one of each of these
But eight is Mom and Dad.

For whether I take parts away
Or turn the parts around,
Within this famiy fact for eight
The answer must be found.

When I play with my mice,
And let three crawl on me,
I know that five are in the cage,
Protesting noisily.

So a family of facts
Isn't hard to understand,
But families of mice are best
Nibbling at your hand.

12. PARTNERS

Fourteen flamingoes
Sitting on a pole
Fourteen flamingoes
Make up the whole

Take away five
And leave nine there
I've taken a part
But flamingoes don't care.

I put five back
To make up the whole
And fourteen flamingoes
Wave from the pole.

Take away nine
And five stay behind
I've taken a different part
Still flamingoes don't mind.

Nine and five are parts
And fourteen is the whole
"All delicious" said the crocodile
Hiding near the pole.

13. PAIRS

If eight and one make nine,
And I know that they do,
Take one away from nine,
That answer's easy too.

Nine takes one leaves eight,
One plus eight makes nine,
When I think about these pairs,
I get them right each time.

14. SIGNS

I'm a plus,
A useful plus,
Two straight lines will create me,
One goes down, one across, you see,

I stand on one leg,
Quite steadily
I'm a no fuss PLUS.

I'm a plus,
A useful plus,
I add the parts to make the whole,
Addition is my life long goal,
When you want to add eight and three
Two lines that cross,
Will make my sign,

I add your numbers all the time.

I'm a take away,
A useful take away,
I'm a sign that you all know,
A short, straight line, west to east I go,

Just like a dash,
That's how I look,
Inside your mathematics book.

I'm a take away,
A useful take away,
I'm used to take a part away,
Right in the middle goes good old
I do enjoy the role I play,
To go between an eight and three,
And know you'll take away with me.

A little line,
Will make my sign,
I take away parts all the time.

15. DOES ANYBODY KNOW?

Does anybody know
Why ducks can't plus a plus
And snakes can't cope with maths at all
Without a dreadful fuss?

Does anybody know
Why worms won't multiply
And platypusses can't divide
No matter how they try?

Does anybody know
Why turtles can't subtract
It's not because they don't know how
I know that for a fact.

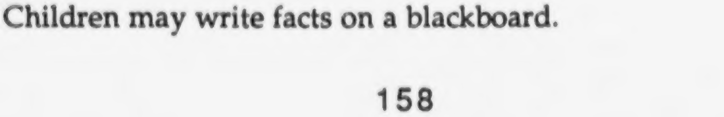
And who can tell me why
Frogs can't add two and two
It's ... because they don't have digits ten
To help keep count, like you!!

Dealing with Visual Learners

1. Precede all oral instructions by concrete manipulations or mimed demonstrations. Each step may comprise two parts:
   - Presentation of visual stimulus only.
   - Visual presentation in conjunction with verbalization.
2. Have children describe the mimed or demonstrated action, pictures, or concrete manipulation, and identify the associated number fact.
3. Provide a visual summary of each step.
4. Encourage children to make mental images of visual stimulus. Provide opportunity for them to reproduce these images (verbal, pictorial).
5. Use cue cards to focus the children's attention.
6. Try a silent lesson.

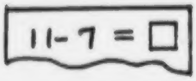
Stress the visual presentation of facts, pictures, patterns and relationships in the sample lessons. Use these techniques:

- **Write over:** (Plastic overlay for worksheet or cards is required.) The children place a worksheet or card under the plastic. They then trace over each number fact and rewrite it as suggested below.

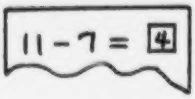


Children may write facts on a blackboard.

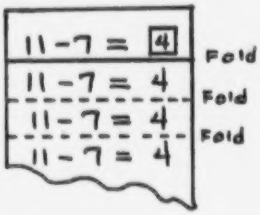
- **Pleat the paper.** (Loose sheets of paper are required.)



1. The teacher writes the unknown fact without an answer at the top of the page.



2. Children read the fact and tell the strategy to be used to get the answer. (Teacher can prompt children.)
3. Children write the answer then trace over the fact and the answer, saying each aloud as they trace. They repeat until they know the fact.



4. Children fold the paper down to hide the fact and rewrite as shown.
5. Children open to check their answer.
    - If incorrect, return to step 1 or another activity to reteach an efficient method for memorizing the fact
    - If correct, repeat the folding, writing, and checking until 3 consecutive correct answers are given.

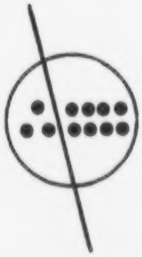
• • • • •

The purpose of the following activity is to help children to make mental images of the visual pictures. The following is one procedure that can be used.

Stage 1
- Study the picture (dot pattern, whole, parts; Doubles, Doubles + 1 pictures; Say and Check cards).
- Let your eyes be a camera and take a photograph.
- Close your eyes. The picture is on your eyelids.
- What can you see?
- What story (number facts) does the picture tell you?
- Say them.
- Write them.

When children are able to do this, move to Stage 2.

Stage 2
- Read the fact (11 - 8).
- Close your eyes.
- Describe or draw the picture you can see for this fact.
- Complete the fact (11 - 8 = 3).



Dealing with Kinesthetic/Tactile Learners

1. Precede all instructions by the physical manipulation of objects by the children. Teacher should guide all manipulations. Each step may comprise two parts:
    - Physical manipulation only.
    - Physical manipulation in conjunction with oral instructions.
2. Remove visual stimulus, if distracting. Have the children close their eyes, or place objects in their hands behind their back.
3. Provide a summary (physical manipulation of each step).
4. Use a cueing system to focus the children's attention.
5. Make use of textured material (pipe cleaners, sandpaper, plasticine), sandtrays and magnetic boards.

Stress techniques like the following. Each time or as needed, the appropriate verbal prompt can be given by the teacher or student.

- **Trace Over.** Children select one fact from those unknown. The teacher writes the fact in large numbers on a card saying the fact and its answer as it is written. The children then trace over the fact saying each part as it is traced. The children repeat the tracing until they feel they can say or write it without looking at the card. They close their eyes, write the fact in mid-air saying it as they go. (During this time the teacher writes the fact without the answer on the reverse side of the card.)

Select the next step according to children's learning needs.

- When children open their eyes let them immediately check their answer by referring to the answer side of the card. Then, reversing the card, have children copy and complete the fact on their pad. They could then check by turning over the card.

- When children open their eyes, direct them to write the fact and answer on their pad. They can check by referring to the answer side of the card.

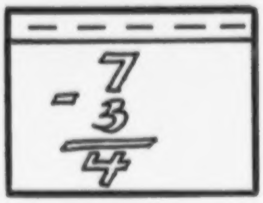
- When children open their eyes, they should copy and complete the unfinished fact. They can check by referring to the answer side of the card.

  Repeat the procedure for other facts being careful to work on 2 or 3 unknown facts in a session. Cards could then be stored in an envelope for re-use in The Bank, Beat the teacher, Five Up, and other similar activities. They could also be used for review at the beginning of each session. If, during this review, children hesitate in answering, repeat Trace Over.

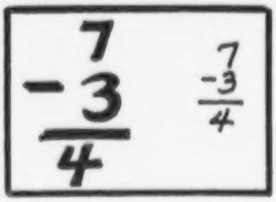
- **Ghosting.** Write the unknown fact with answer in large print on the blackboard. Have children trace over the fact with their finger saying each part aloud. Repeat the tracing until the "ghost" of the fact remains (until the chalk has been rubbed out).

  Variation: (For children with visual deficits)--Have children close their eyes while the teacher guides their hands in tracing the fact.

- **Stencil In.** (Cut out cardboard stencils of unknown facts—not duplicating masters.) Using the stencil children "write" the fact with a finger, saying each part aloud. Children can then use a crayon to fill in each part of the fact. Lifting the stencil, children can then rewrite the fact beside the colored one.



Stencil is stapled to a piece of paper.



- **Sand Trace.** (A sand tray, baking dish and sand will be required.) The children copy the number fact in the sand, saying each part aloud.

  Alternative: Place the card with the unknown fact in the tray and sprinkle lightly with sand. Have children trace over the fact saying it aloud as they do so.

- **3-D Write Along.** (String, dried glue or glitter over glue, sandpaper or other textured number fact cards will be required.) Have children finger-trace over the unknown fact, saying it aloud before writing it.

- **Finger-Trace.** (Number fact cards with the fact and answer on one side, fact only on the reverse side will be required.) Children finger-trace and say the fact with the answer. Then reversing the card they read the fact and give the answer immediately. The fact could then be written.

  Alternative: After tracing, children could close their eyes to PICTURE the fact in their mind as they write it in mid-air. While writing, children should say the fact with the answer. After opening their eyes and checking, they could reverse the card as above.

Sometimes it is necessary to tailor instructions to help children with specific learning difficulties. Ideas like the following may be useful.

Dealing with Students Having Receptive Language Difficulties

1. Present activities as given but break instruction into smaller units.
2. Exaggerate key words, phrases, and pause before or after key words are used.
3. Use pictures, gestures, concrete manipulations and written material to supplement the words. Match to children's needs and preferences. Draw on suggestions for visual and kinesthetic/tactile learners.
4. In severe cases, some use may be made of the deaf sign and cueing system.
5. Present the verbal prompts for each strategy in written form. Break into meaningful units (phrases).
6. Modify worksheets accordingly.

Dealing with Students Having Expansive Language Difficulties

1. Follow activities as outlined. When oral responses are required, accept the children's modified versions as interim measures.
2. Allow sufficient time for the children to express ideas (e.g., 10-second wait periods). Accept breaks in responses. Monitor carefully; do not rush the children.
3. Avoid speaking for the children.
4. Accept the children's use of aids to supplement their attempts to exhibit meaning: concrete manipulations, gestures, mime, and drawings.
5. Accept key words combined with actions for repeating or interpreting the verbal prompts highlighted beneath the title of each sample lesson in this resource.
6. Modify worksheets. Require less (but be selective!). Place answer digits randomly along page margins or tape these to a place clearly visible from the children's working area. Alternately, post a numberchart or hundreds chart on the wall to which the children can refer.

Dealing with Students Having Abstract Reasoning Difficulties

1. Present activities as given. Stress the actions and use of pictures (e.g., for 2s and 5s) and other visual aids (e.g., real objects instead of just pictures; demonstration clock.)

2. Try to ensure that the link between the words and actions has been made. Have the children describe the action as it is carried out.
3. Have the children carry out any manipulations of concrete materials.
4. Use pictures to supplement written symbols. Stress, and where necessary, modify the use of cards and aids.
5. Kinesthetic/tactile strategies are sometimes appropriate. Draw on ideas for kinesthetic/tactile learners.
6. For the verbal prompts highlighted for each strategy, use a pictorial form OR a written sentence by the picture.
7. Modify worksheets to incorporate pictures, cards, and aids when possible.
8. Encourage the children personally to use pictures, cards, and aids as necessary when doing seatwork.

Summary Comments

Learning handicapped children frequently exhibit characteristics which suggest a problem related to a particular learning mode (e.g. auditory). In most cases the task should be presented, initially, in a mode that reflects the area of strength (e.g. visual) and not the area of difficulty. However, the mode in which the difficulty exists should not be overlooked but should be incorporated into the task in a later step.

The guidelines above present ideas which should help teachers to take advantage of children's auditory, visual, and kinesthetic strengths while focusing on the memorization of number facts. Though detailed variations have not been written for other areas of difficulty, they should be taken into account. For children with gross or fine motor skills, for example, one should be more selective in the choice of the concrete materials and teaching aids or cards that are used. Sometimes those children will have to watch teachers manipulate and predict or otherwise describe an outcome. Alternate means of recording may also need to be considered.

If children have visual perception difficulties, many suggestions for auditory and kinesthetic/tactile learners will be appropriate. These children also profit from color highlighting (as suggested in the section for visual learners). In severe cases it may be necessary to limit the number of problems or to rewrite worksheets to remove irrelevant visual stimuli and provide more room for each written response.

Thought needs to be given to the presentation of material and implementation of tasks to highly active children. Though no rigid rules can be laid down, it is generally agreed that stimulus material should be reduced to the minimum. Any materials (such as counters, paper, books, pencils, etc.) extraneous to the task at hand should be removed.

The needs of very lethargic children should not be overlooked. Care should be taken to ensure that children are physically and mentally involved in the task. In this case there is usually a need to make the materials stimulating.

The ideas presented above have proved most useful for helping children with special learning needs succeed in a number fact program in which the goal is fact memorization or mastery. Most of the ideas can be adapted to promote success for these children with other math topics and can extend into other curriculum areas as well.

Activities Using Mechanical Aids

Mechanical aids such as calculators, language masters and tape recorders cannot replace understanding but can be used to supplement activities and provide another medium of presenting the material. Though they should not be used exclusively, they do provide the opportunity for individual experience.

Calculators

Calculators should only be used when children have the necessary prerequisite skill and understanding to carry out the required task. This includes those skills and understanding related to the machine.

Ordinary calculators may be used in a number of ways:

- They can be used to check answers on worksheets. Children can be given the opportunity to find their own errors before the teacher works through the sheet with them.

- They can be used in a structured activity to convince children that, for basic facts, they are faster than a calculator. Children could complete two tasks that are similar, one without and the other with a calculator, and then compare the number of correct responses and the time taken.

- They can be used to generate a number of facts for comparison (Add to Check facts, Partners, Turnarounds).

Note: Calculators with larger keys or with an output tape should be used by children with motor problems.

Care must be taken to ensure that children use the calculator appropriately. To point this out to the students, the group can be divided so that some use the calculators and some do not. Times taken to complete specific tasks are then compared.

Language Master

A master set of facts can be developed according to the organization within this resource. Language Master cards could be color coded to match each specific set of facts: Count Ons, Zero facts, and so on. Color coding helps students find and return facts to their correct place easily.

Students can then use their own record keeping system to select facts for individual practice. If the system is set up, the children can go to the language master corner and practice when they have a few minutes to spare, or when they are waiting for the teacher to help them.

Other specific uses of the Language Master follow.

- Teacher tapes the fact 6 - 2 without the answer on the master track. Children record the completed fact 6 - 2 = 4 on the second track. They remove the card and check with the response or strategy hint written on the back. If correct, they go on to next fact. If incorrect, they record the correct answer and play it a few times. Children read the corrected fact with the tape.

$$\begin{array}{r}6\\-2\\\hline 4\end{array}$$

- As above, but auditory stimulus only.

6 - 2 = ☐ Make cards as illustrated.

- Record fact on card with answer or strategy hint being recorded after the cut. Children play teacher's track. When the card stops, children respond. Children then push the card on to check their response against the teacher's. If appropriate, children's responses could be written. Children hen record the completed fact on the second track.

Stage 1: 6 - 2 ... = ☐

Stage 2: 6 - 2 ... = ☐

Stage 3: 6 - 2 = 4

Record the fact (master fact) and its answer on the tape. Allow the maximum space available before the answer is recorded. Produce a series of cards (three to five) and, each time, reduce the space before the answer is given. Children try to give the answer before the teacher's response. The completed fact is then recorded, by children, on the second track. As children become proficient at one stage, they move to the next.

Tape Recorder

A tape recorder can be used in similiar ways to a Language Master except:

- There is no visual stimulus is attached to the tape.
- Only one track is used.

Children can record answers to written work on tape. Incomplete facts can be recorded on tape at intervals appropriate to students' response speed. Students write responses or completed facts on paper. If it seems helpful, students can identify the strategy, record it, and write the fact in the appropriate column.

Clock 5 or Turnaround	Zero Fact	Squares
9 - 3 = 6 11 - 2 = 9	6 - 0 = 6 9 - 9 = 0	8 - 4 = 46 14 - 7 = 7

A set of facts is recorded. Students write each fact and another that makes the pair, partner.

Students can record a set of facts, leaving a space before they give each answer. They then can play the tape and try to give the answer before the tape.

Incomplete facts are recorded. Students could be asked to complete only particular facts suggested by the teacher, for example, Double +1 Facts.

Speed Up Activities for Learning Disabled Students

Once children can complete facts using given strategies, they can be given experiences to speed up their responses. Speed-up activities should only be used when children know how to work out facts efficiently and accurately, but are slow arriving at the answer. (Care should be taken not to prematurely introduce children to speed-up activities.

When introducing speed-up activities, wait time should be sufficient to allow children to respond with a correct response. When the baseline is established, the wait time should be gradually reduced until children can respond correctly within two or three seconds.

Children with motor or language problems should be given special consideration. For these students, speed-up activities could take a different form. For example, children with motor problems could build up speed through the auditory mode by using a tape recorder. These students can keep a record of the time taken to complete a set of facts and try to better their record in subsequent trials.

Sample Speed Up Activities (with modifications for special learning needs):

Mix and Match: Use flash cards. Mix and place them face down on the table. Children turn them over and match selected facts with answers, Pairs, Partners or Family Cards. The cards are checked for correctness.

Incorrect responses are noted for additional practice. The time taken is recorded—(28 correct in 3 minutes 30 seconds). At a later stage the task is repeated. Facts correct and time taken are compared to previous attempts. (This time 35 correct out of 40 in 2 minutes 40 seconds).

Beat Yourself: (A Tachistoscope, flashcards, or transparency for an overhead projector will be required.)

- Present each fact for a given time (to be reduced gradually to 2 or 3 seconds). Children give an oral response. As above, a record of numbers correct in the given time could be kept.

If children have expressive language difficulties, place cards with answers only randomly about the room. Children can be aided in expressing answers for any of the above activities by referring to the cards. As children become more confident, cards can be removed.

Four Square: Prepare four small worksheets, each having 10 basic facts (no answers). The relative difficulty of the facts on each sheet should be similar. Give children one sheet at a time. Allow them 80 seconds to complete the first worksheet, 60 seconds for the second, 50 for the third, and 40 for the fourth.

REPEAT AT A DIFFERENT TIME. GRADUALLY REDUCE THE TIME TO THIRTY SECONDS.

Time Yourself: (A stopwatch and worksheet will be required). Ask children to estimate the length of time needed to complete a worksheet. Children complete the sheet and record the time shown. Using a master copy, children check the answers. Incorrect answers are circled for further practice. The teacher can help children to keep a record of the number correct and the time taken. Children should be encouraged to improve this record.

Five Up:

- Help children select five known facts.
- The teacher flicks through these flash cards, allowing 3 or 4 seconds for each answer.

- When children seem confident of these facts, replace one of the known facts with one that is troublesome to children.

- Repeat steps 2 and 3 as often as necessary to incorporate unknown facts.

THIS ACTIVITY COULD BE USED AT THE BEGINNING AND AT THE END OF A SESSION. REPEAT FOR SEVERAL SESSIONS.

Beat the Calculator: Many of the activities in the Calculator section can be modified to become Speed-Up activities.

Tape Recorder: The tape is one means of helping children with motor problems, build up speed with oral facts. The activities above (Beat Yourself, Time Yourself) could be modified for use on the tape.

Children could record completed facts on a tape at their own rate. Children can then replay the tape and try to give the answer before it is given on the tape. Such tapes could be shared by peers.

The teacher could prepare a tape with completed facts, with a pause between the fact and its answer. By building up a series of tapes or within one tape, the pause between the fact and answer could be shortened.

Management Strategies for Learning Disabled Students

A major purpose of ideas in this section is to help the teacher and children develop, modify and devise strategies to overcome attention difficulties associated with their learning problem. A structured, organized learning environment involving reasonable expectations and carry through is critical, as is suggested by the following.

Organizing Facts for Study

Create the following for each child:

- Individual Cross Out Sheets (see the Check Up section for details).
- A Number Facts Bank. This involves, for each student, a deck of facts written on cards. These cards would be stored in a box labeled "FACTS BANK." The box would be divided into THREE main sections:
  1. Facts I know well.
  2. Facts I can work out.
  3. Facts I do not know yet.

  Each of these sections could be sub-divided to organize the facts according to their strategy (Count Ons, Zeros, . . .).

  Such a Bank provides:

  1. A storage place for known facts (to see the number of known facts increase is motivating for children).
  2. A set of known facts which the teacher can draw from when preparing individual activities and worksheets.
  3. A means for checking long term memory. Children enjoy emptying their banks from time to time to count the number of facts they know. To return the facts to the bank, the children must be able to provide the answers immediately. If the children hesitate on a fact, it is placed either in the teacher's file or with the other facts that the children are currently studying.

AS CHILDREN WORK THROUGH THE PROGRAM, CHANGES SHOULD BE MADE TO THE CROSS OUT SHEETS AND TO THE NUMBER FACTS BANK.

Using the Facts

Facts I know well. Knowledge of these facts should be reviewed periodically. The teacher could also draw on these facts for other mathematics activities in which the primary focus is not basic number facts.

Facts I can work out. Facts from this section should be used when designing activities to provide additional practice.

- Children could select from these cards when playing board games.
- If a Language Master is available, a set of number facts could be made and organized into sets (Count Ons, Zeros and so on). Children could then select cards for additional practice. They could undertake this activity if they finish an activity and the teacher is not available.
- Facts from this section could be used for further memorization activities. These should be tailored to meet individual learning needs. Verbal prompting, rhythmic work, tracing, and writing are options to be considered.

Facts I do not know. These facts could be used when preparing activities to reinforce existing strategies or to develop others which will lead to the efficient retrieval of the facts. Use ideas from the sample lessons to help children develop strategies for learning these facts.

Applying to Computation

In teacher-directed work, activities like the following can be used to prepare children to transfer their knowledge of basic facts to computation.

- Review the facts to be used in the computations before they are begun.
- Identify harder facts. Read the examples and have children identify a helpful strategy for remembering each.
- Learning disabled children commonly exhibit two difficulties related to the use of facts in computation.

(1) *Does not recall known fact* —When presented with new or unfamiliar computation procedures, learning disabled children frequently "go blank" and cannot recall facts already know. The problem is one of transfer to the new situation.

Teachers can help by using examples that contain easy facts whenever new work is presented. These facts are more established and are less likely to cause problems. For similar reasons teachers could use examples with easy facts when testing newly learned skills or procedures in other mathematics areas, such as computation and measurement.

Strategies for independent work include:

- Having children quietly say the fact as they work. Saying the fact aloud often stimulates recall.
- Having children finger-trace the fact as it is said.
- Having children write as the side the fact causing difficulty. Seeing it in isolation often triggers recall.

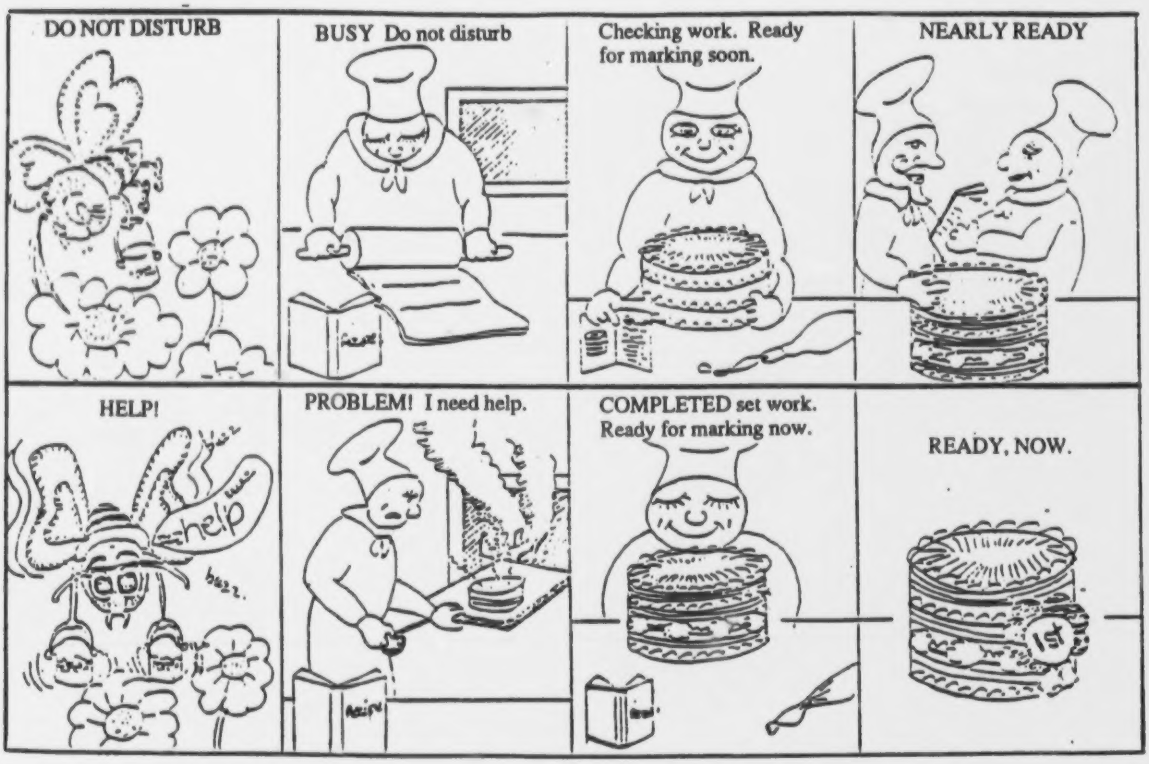
(2) *Does not know all of the facts.* Though all facts are not mastered, some children are ready to handle larger computations. These children could be tested individually. Help the children blacken completely all known facts on their worksheets. (A thick felt-tipped pen could be used.)

When children need help, they should refer to this sheet during mathematics lessons. Relevant sections of the sheet can be glued onto both sides of cardboard to make a book mark for their mathematics pad. As additional facts are mastered, they should be blackened so children do not become dependent on the sheet for known facts.

Self Management

Message cards can be used to help students focus and maintain attention on the task at hand. A sample set of message cards is given below. The students and the teacher can work together to develop cards that will best fit a situation.

- **Message cards:**


DO NOT DISTURB
BUSY Do not disturb
Checking work. Ready for marking soon.
NEARLY READY
HELP!
help
buzz.
PROBLEM! I need help.
COMPLETED set work. Ready for marking now.
READY, NOW.
1st

The purpose of these cards is to help very active or easily distracted students to stay seated and to remain on task. They should only be introduced when the child's concentration span is of sufficient length (10 minutes) to make their use purposeful.

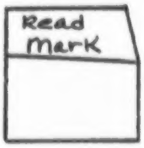
The students display the relevent sign as they work. When required, they change the sign and the teacher can go to them rather than having the children move about the room. However, care must be taken to provide children, particulary very active children, with legitimate reasons for moving about the room.

- **Individual Work Cards**

Learning disabled students frequently exhibit behavior of disorganization. These sample work cards have been designed to help students work through a particular task successfully. Initially, the teacher should work with students to modify the card and to modify a work card to fit the task at hand and to help students acquire the skills skills necessary to use them.

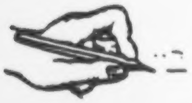
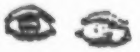
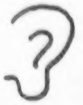
Individual work cards can provide focus on major strengths in specific modes and may require modification to fit the learning needs of individual children. Some students work best when the sequence on a work card is revealed step-by-step. In this case a cover sheet may be developed.

Listen Think Sort How? Do Write Check	Read Mark Think Sort How? Do Write Check	Trace or Mark Think Sort Move Do Write Check



- **Cue Cards**

The cue cards below have been designed for use by the teacher as another means of focusing the childrens' attention. Instead of speaking, the teacher selects and shows a card to initiate a task. Some children who are confused by oral commmands respond well to this visual approach.

WRITE

LOOK

LISTEN

SHOW

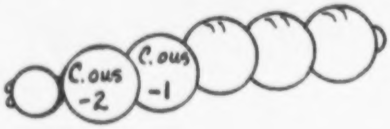
Record Keeping

Different approaches used by teachers to help students track progress toward number fact mastery are given below.

- Children build up a "Fact Bank" to keep a personal record of known and unknown facts.
- Children build up a "dictionary" of facts to record known and difficult facts.

Facts are recorded under strategies, e.g., Count Ons, (+1, 2, 3), Doubles, Tens, Zero facts, . . . Known facts are written in blue. Facts that children have had difficulty in remembering could be written in red. Related facts (turnaround, pairs, partners, families) are recorded as well as the relevent verbal prompt.

- Children glue a blank fact chart in front of a mathematics pad and write in facts as they are learned.
- Completed fact charts are glued in cardboard folders and known facts blackened for use with computation.
- Individual Cross Out sheets, described in the Check Up section are created.
- Teachers retain a copy of the fact chart in individual files as a personal record for each of the children. Instead of blackening in facts, dates could be recorded.
- Pictorial graphs, if relevant, could be created to map student progress.
- To assist motivation, "a fact worm" could be formed. As each set of facts is learned, it is recorded on a segment of the worm.



Home Involvement

The quality of home involvement and support varies from child to child. Many parents follow the school progress of their youngsters, and welcome the opportunity to stay abreast of what is happening. The area of basic facts is one important area in which parents should be informed and updated, for they can provide useful support in helping their children master basic number facts.

A good first way to involve and inform parents is to use the Addition Cross Out Tree at the first Back to School parent meeting or conference in early fall. If your school does not schedule such an event, the trees might be assembled and taken home by children with a brief note from you.

Parents of young beginners might be instructed to shade certain hard facts on the tree yellow (e.g. the Doubles + 1 and Make 10, Add Extra facts), to indicate that these are Challenge Facts. "Children may study and learn these facts if they wish, but mastery is not required of all students this year." (Teachers will, of course, be guided by district policy in this regard.)

A brief explanation about each strategy named on the tree also is in order. If you can take a few minutes to illustrate a few strategies at a Back to School or parent conference session, that is most effective.

Even if you do this, it may be useful to send parents an abbreviated copy of the Thinking Strategy Terms for addition. Most teachers prefer to send home only one or two ideas or terms related to the strategies at a time. The letters may offer suggestions for doing this.

Later in the year, a similar device (e.g., a pine tree) could be used to list subtraction facts by strategy. You will want parents to be informed about new subtraction strategies and also stress the need to keep addition facts fresh in mind. One teacher put it this way:

"Dear family: For subtraction, I want to familiarize you with some of the strategies we're using to find the answer. When subtracting 1, 2, or 3 as in 6-2, we start at 6 and COUNT BACK two numbers to the answer, 4. Later we'll add to check, so keep practicing the addition facts daily, especially the Count Ons which we'll be using when we start adding to check subtraction work."

As work with facts continues, you'll want especially to document the progress of children who are having most difficulty. Keep individual Cross Out sheets for these pupils or save samples of their work so these can be compared to the Class Cross Out list at parent conferences.

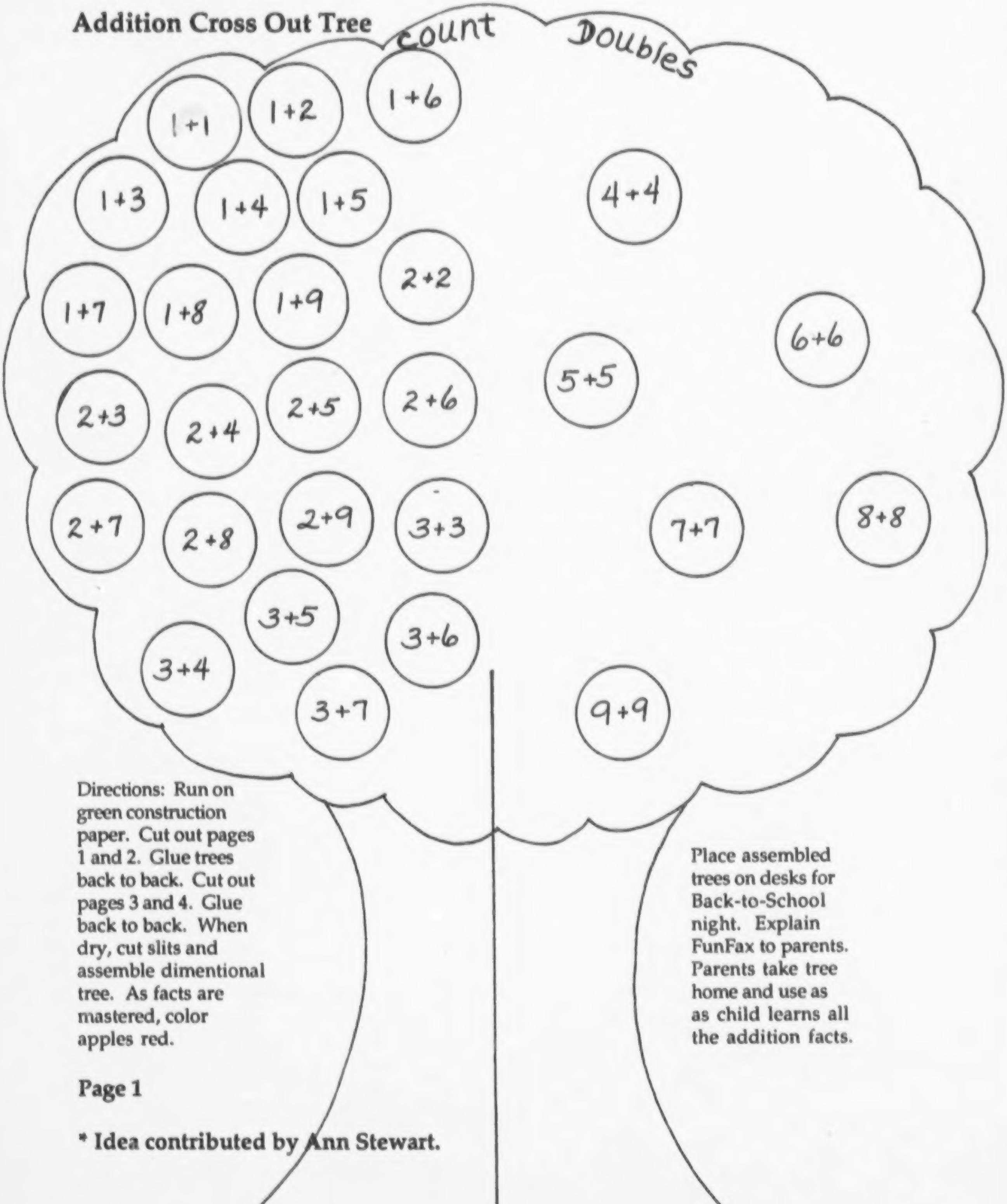
If children lag behind, it really is NOT very helpful just to say: "Terry needs to study subtraction facts." Parents need to know specifically which facts should be studied first (a small number), how often, and how long you might expect them to study each day:

"Terry needs to study these facts." (List them.) I want him to study them for two minutes every night this week. Please show him how to set a timer or set up some other way to keep track of the time. If Terry needs help, the strategy we've been using to work them out is ..."

Unless parents are informed, they have nothing better to do than pull out flash cards at random. They may also have Terry study only when they happen to think about it or when there is extra time.

Some teachers send home "Cool Facts" for the refrigerator door. Others routinely send home card stock flash cards color coded to the strategy that now is being practiced in SPEED UP games, exercises and activities at school. Many teachers ask parents to validate time spent practicing the facts, as is suggested in the sample letters.

Addition Cross Out Tree

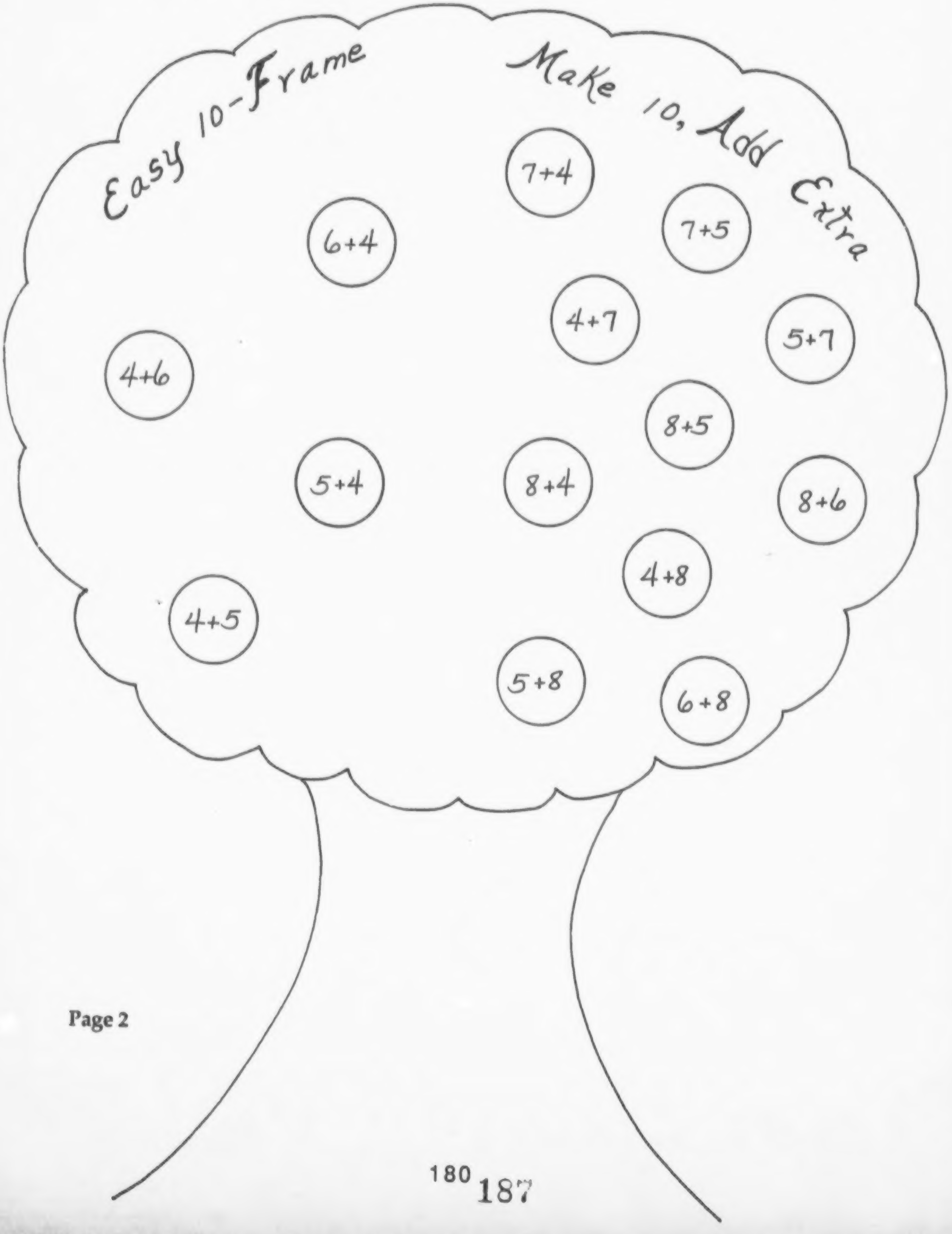

count
Doubles
1+1
1+2
1+6
1+3
1+4
1+5
4+4
1+7
1+8
1+9
2+2
6+6
2+3
2+4
2+5
2+6
5+5
2+7
2+8
2+9
3+3
7+7
8+8
3+5
3+6
3+4
3+7
9+9

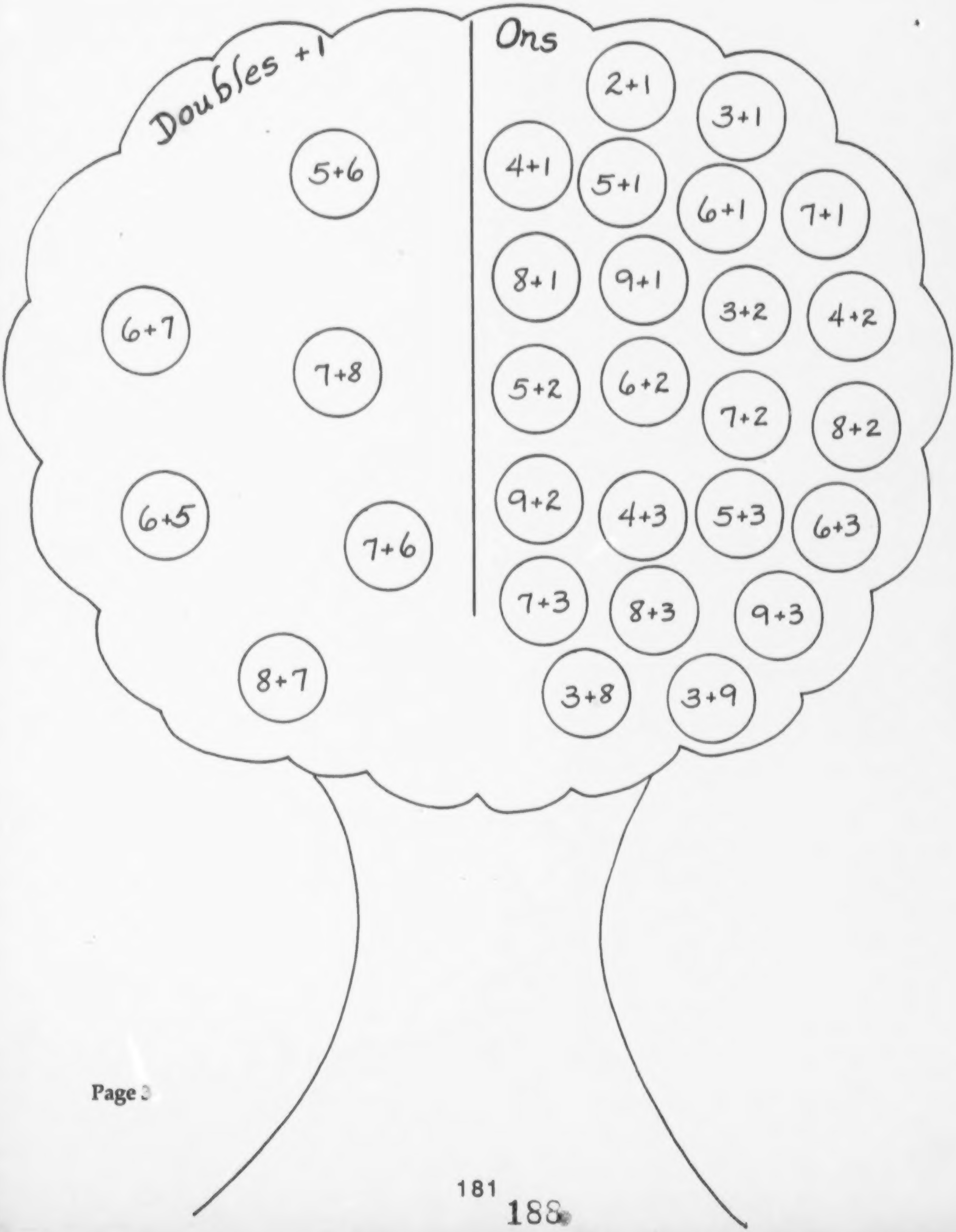
Directions: Run on green construction paper. Cut out pages 1 and 2. Glue trees back to back. Cut out pages 3 and 4. Glue back to back. When dry, cut slits and assemble dimentional tree. As facts are mastered, color apples red.

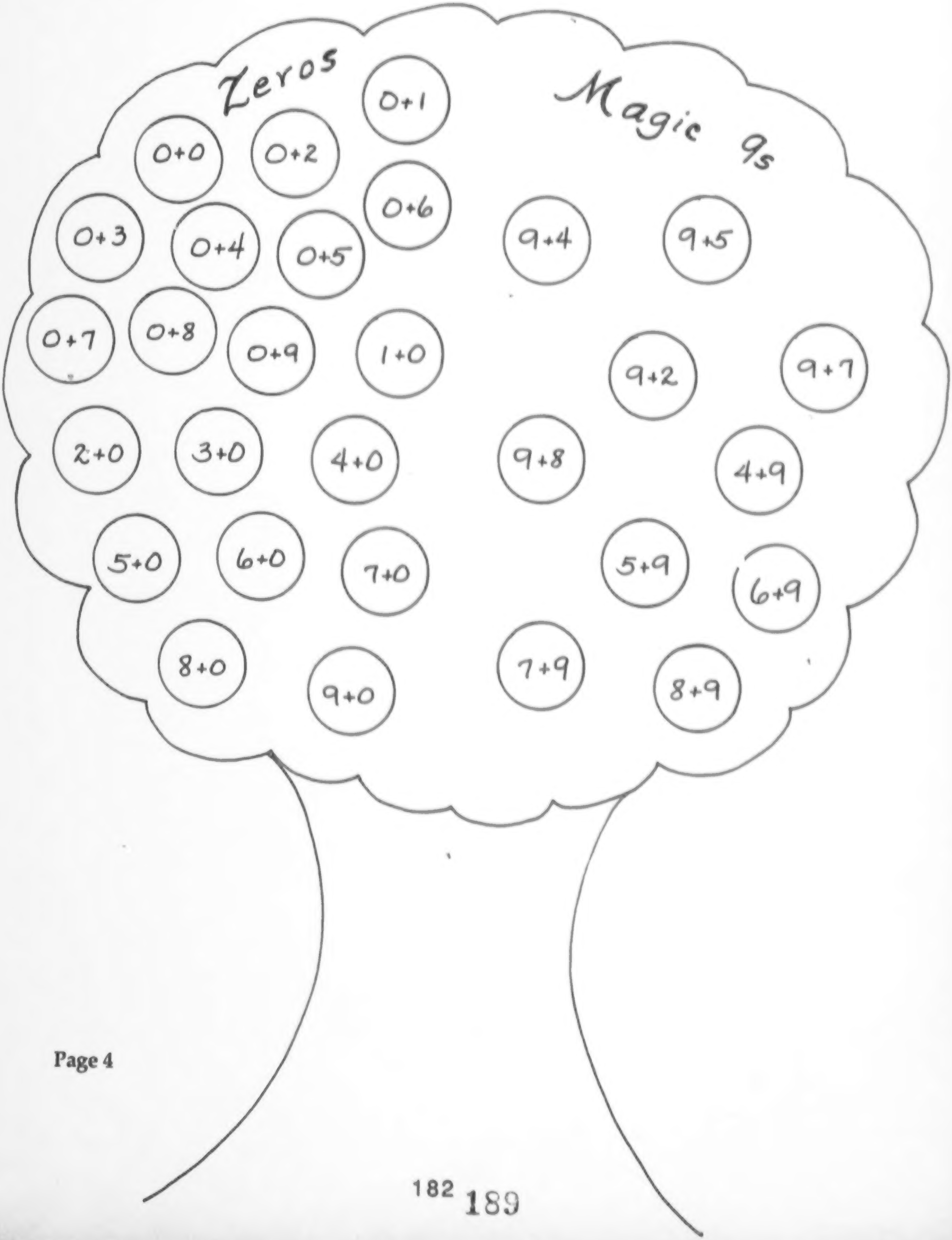
Place assembled trees on desks for Back-to-School night. Explain FunFax to parents. Parents take tree home and use as as child learns all the addition facts.

Page 1

*** Idea contributed by Ann Stewart.**


Easy 10-Frame
Make 10, Add Extra
6+4
4+6
5+4
4+5
7+4
7+5
4+7
5+7
8+5
8+4
8+6
4+8
5+8
6+8


Doubles +1
5+6
6+7
7+8
6+5
7+6
8+7
Ons
2+1
3+1
4+1
5+1
6+1
7+1
8+1
9+1
3+2
4+2
5+2
6+2
7+2
8+2
9+2
4+3
5+3
6+3
7+3
8+3
9+3
3+8
3+9


Zeros
0+1
0+0
0+2
0+6
0+3
0+4
0+5
0+7
0+8
0+9
1+0
2+0
3+0
4+0
5+0
6+0
7+0
8+0
9+0
Magic 9s
9+4
9+5
9+2
9+7
9+8
4+9
5+9
6+9
7+9
8+9

Sample Letters to Parents

(date)

Dear Parents,

As we study the basic facts for addition we will try to keep you informed of some of the special clues used to help us remember the facts.

This week we are learning to count on rather than using fingers to find answers to any number fact in which a 1, 2,3, is added. There are 45 Count Ons:

The +1 Count Ons: 1+1, 2+1, 3+1, 4+1, 5+1, 6+1, 7+1, 8+1, 9+1;
The +2 Count Ons: 1+2, 2+2, 3+2, 4+2, 5+2, 6+2, 7+2, 8+2, 9+2;
The +3 Count Ons: 1+3, 2+3, 3+3, 4+3, 5+3, 6+3, 7+3, 8+3, 9+3;

The 45 includes turn-arounds, for when we know one fact, we really know two!

5+2=7 and 2+5=7

When we turn the numbers around in addition, we get the same answer.

As you drill the Count Ons with your child, please give this verbal prompt when needed:

"See a 1, 2, 3 in addition?
Start big and count on."

For example for 6+3 or 3+6, we start with the larger number (6) and count three more (very quickly in our heads): 6...7, 8, 9. The answer is 9.

For the next 2 weeks I am asking all children to practice the Count Ons for 2 minutes on five days each week. On the Monday after each week's practice, please complete and return one of the attached forms so I have a record of your child's work.

Thank you!
Ms. Anderson

Please return on ________________.

I verify that my child, ______________________, has studied addition "Fun Facts" for 2 minutes on each of the following days (circle)

M T W R F SAT SUN

____
(Parent's signature)

Please return on ________________.

I verify that my child, ______________________, has studied addition "Fun Facts" for 2 minutes on each of the following days (circle)

M T W R F SAT SUN

____
(Parent's signature)

Please return on ________________.

I verify that my child, ______________________, has studied addition "Fun Facts" for 2 minutes on each of the following days (circle)

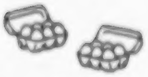
M T W R F SAT SUN

____
(Parent's signature)

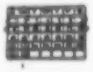
Dear Parents,

We've been studying the addition Doubles enclosed in the attached envelope. Some children need to practice these facts so they give the answers more quickly. If children don't remember the answer to a Double, we've been saying:

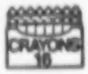
"See a Double? What picture will help?


6 + 6

(12 eggs)

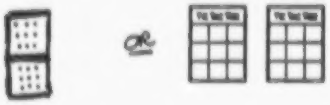

7 + 7

(14 days)



9 + 9 is below; 8 + 8

(16 crayons)



9 + 9

(double 9 domino)

Please check out how fast your child can say the Doubles facts.

I am asking all the children to record their best "time" for each day on the slip below and return it on Friday.

Thank you!

Miss Britts

How many seconds does it take to answer all the Doubles cards?

Tuesday:______seconds; Wednesday:______seconds;

Thursday:______seconds;

Name of child:____________________________

Parent's signature:__________________________

Dear Parents

As we review our study of the basic facts for addition, we will try to keep you informed of some of the ideas we are using to help us remember the facts.

This week we will be reviewing the Magic 9's. This strategy will emphasize the following facts: 9 + (4, 5, 6, 7, 8) and their turnarounds. When we know one fact, we really know two! 9+6=15 and 6+9=15 When we turn the numbers around in addition we get the same answer.

To help your child work out answers to unknown facts in an efficient way, please use this verbal prompt:

"See +9? Use the pattern to help."

(The answer always starts with one ten. The number in the one's place is one less than the number being added to 9.)

$$\begin{array}{r} 9 \\ \underline{+4} \\ 1\underline{3} \end{array} \qquad \begin{array}{r} 6 \\ \underline{+9} \\ 1\underline{5} \end{array} \qquad \begin{array}{r} 8 \\ \underline{+9} \\ 1\underline{7} \end{array} \quad \text{1 Less}$$

For the next week, I am asking the children to "study" the Magic 9's (cards in attached envelope) for two minutes on five days. Please show your child how to set a timer or otherwise help to keep track of the two minutes. The goal is to become very quick in giving answers. On the Monday after the week's practice, please complete and return the attached form.

Thank you!

Mrs. Marge

Please return on __________________.

I verify that my child, ______________________________________, has studied the Magic 9's for two minutes on each of the following days (circle):

M T W R F SAT SUN

____
(Parent's signature)

Please return on __________________.

I verify that my child, ______________________________________, has studied the Magic 9's for two minutes on each of the following days (circle):

M T W R F SAT SUN

____
(Parent's signature)

Please return on __________________.

I verify that my child, ______________________________________, has studied the Magic 9's for two minutes on each of the following days (circle):

M T W R F SAT SUN

____
(Parent's signature)

Monday

Dear Parents,

Please review the follwing subtraction facts with your child:

12	11	11	9	9	8	9	8	7	8	7	6	7	6	5
-9	-9	-8	-8	-7	-7	-6	-6	-6	-5	-5	-5	-4	-4	-4

These facts are called Count Ups. They are facts in which the numbers are "close neighbors." In each case the answer is 1, 2, or 3.

The goal is to memorize these facts. When we can't think of the answer right away, we say: the known part (e.g. "8" in 11-8), then count up to the whole: (8...9, 10, 11). We counted up three numbers so the answer is 3.

It would be helpful if you would check that your child studies these Count Ups every day this week. We will have our FUN quiz on Friday. The goal is to know these facts so well that the answers will given very quickly.

Thanks!

Mr. Nelson

Home Involvement: Game and Activity Ideas

Suggestions for Use by Teachers: Cut out the directions and clip or staple them to a copy of the related game sheet for students to take home. You also may want to send home a list of facts to be practiced. **These should be selected according to the strategies that have been developed.** For example, the Number Fact Wheel could be used for -2, -3, or -9 facts. After other subtraction facts are mastered, the wheel can be used for review and to reinforce the "Add to Check" idea. You may want to tell parents the strategy hints you provide if children do not know facts in the list you provide. The sample letters to parents in the preceding section may provide ideas for doing this.

* * *

Try to Beat. (A "speed up" game for math fact practice.)

Use the attached sheet or simply number two columns 1 - 5 as shown. The name of the person playing with the child should be entered by the * at the top and bottom of the second column.

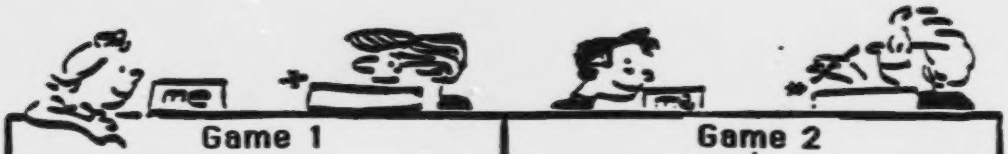
Select 10 number facts and study these with the child. Then one by one, show and read a fact aloud, and allow a short time (about 2 seconds) for the child to write the answer in the column headed "Me" on the sheet.

The child tries to write the correct answer before you give it. If the child can do this, the answer counts as 1 point in the column tally. If the child answers incorrectly or is unable to respond before you give the answer—then the child should write the problem and its answer in the second column, and whoever is playing with them gets 1 point in the column tally.

After the 5 facts of the 10 have been called, add up the points in each column to see who wins the round. Play again! See who wins 2 out of 3 rounds.

* * *

Try to Beat



Game 1		Game 2	
1.		1.	
2.		2	
3.		3.	
4.		4.	
5.		5.	
me ☐	* ☐	me ☐	* ☐

Game 3		Game 4	
1.		1.	
2		2.	
3.		3.	
4.		4.	
5.		5.	
me ☐	* ☐	me ☐	* ☐

Seven is Heaven (A "speed up" game for math fact practice.)

Give the child a copy of the "Seven is Heaven" score sheet.. Enter seven number facts on your copy of the score sheet to form a calling sheet. Call out the facts one at a time and have the child write the answers on the sheet. The length of time allowed to write an answer should gradually be decreased from one game to the next:

> Example: In the first game, allow up to 5 seconds for each answer; in the second allow 4 seconds for each fact; in third, 3 seconds; and in the fourth game, 2 seconds for each answer.

Use the same seven facts for each game, but present them in a different order each time. As the child becomes more sure, you might cut the response time to 4, then 3, 2 and 1 second(s) per fact for consecutive games.

A child's score in this game is found by:

- adding 1 to the number correct in Game 1;
- adding 2 to the number correct in Game 2;
- adding 3 to the number correct in Game 3;
- adding 4 to the number correct in Game 4;

and finding the total scores for the four games.

(Younger children may be permitted to use a calculator to find this total.)

Seven is Heaven

Game 1

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
6. ____________________
7. ____________________

TOTAL ☐

Game 2

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
6. ____________________
7. ____________________

TOTAL ☐

Game 3

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
6. ____________________
7. ____________________

TOTAL ☐

Game 4

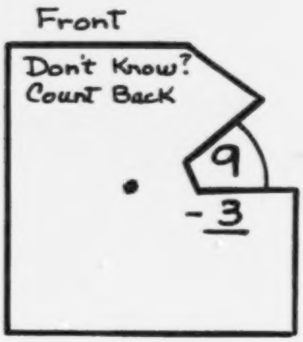
1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
6. ____________________
7. ____________________

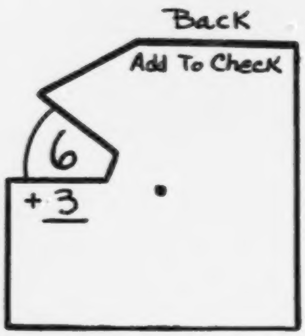
TOTAL ☐

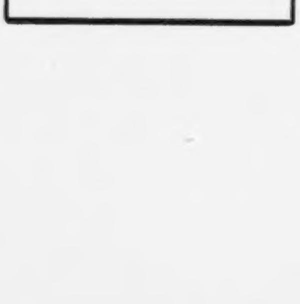
Number Fact Wheel

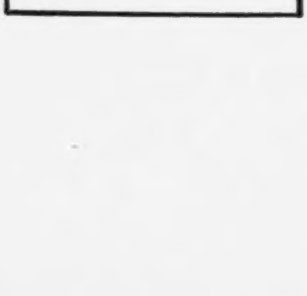
(A "speed up" game for math fact practice which also emphasizes the add to check idea.)

The child should first answer each subtraction fact—then turn the wheel over and add to check. Keep track of the total number correct, or of the time taken to get back to the "green dot" starting point. Encourage the child to try to do even better the next time they play..

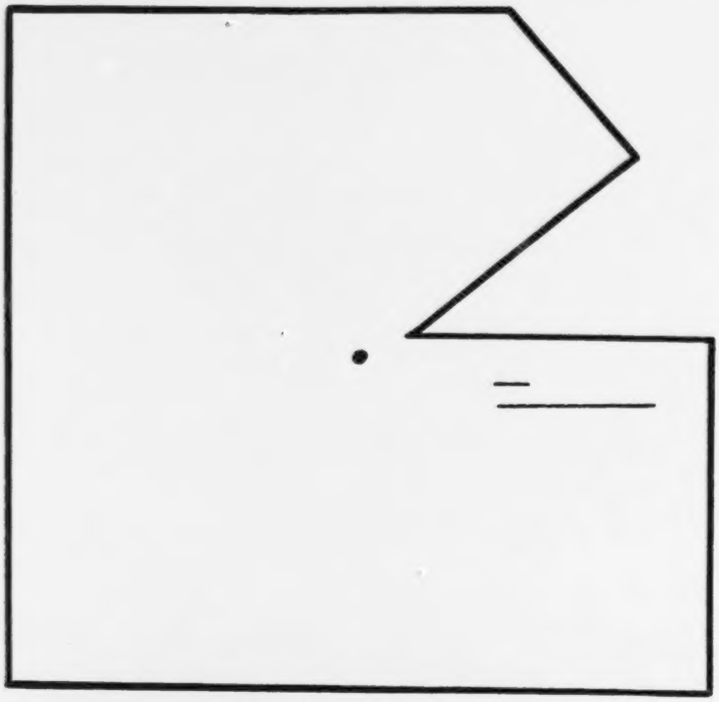

Front
Don't Know?
Count Back
9
- 3

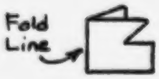

Back
Add To Check
6
+ 3


Don't Know?
What's The pattern?
15
- 9


Add To Check
6
+ 9

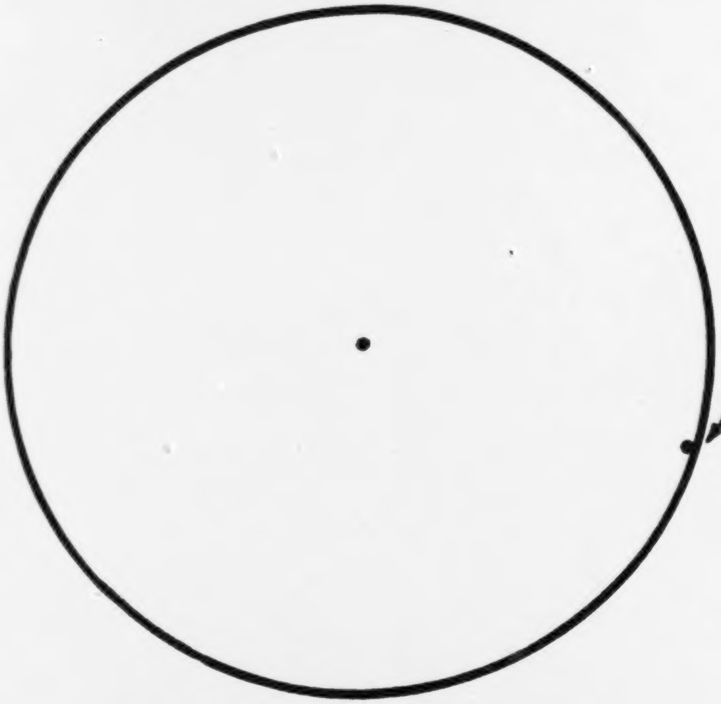
Shaft





1. Cut shaft and wheel out of card stock.
2. Attach wheel inside shaft with a paper fastener.
3. Then write subtraction and addition-to-check facts on the wheel.

Inner Wheel



Green dot starting place for the first fact.

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Appendix A:

Jiffy Quizzes

FUN QUIZ

September

1. ________

2. ________

3. ________

4. ________

5. ________

6. ________

7. ________

8. ________

In all,

____ leaf
math facts

FUN QUIZ

October

1. ________

2. ________

3. ________

4. ________

5. ________

6. ________

7. ________

8. ________

In all,

______ ghost
math facts

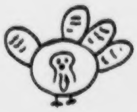
FUN QUIZ

November

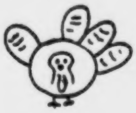
1. ________

2. ________

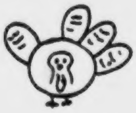
3. ________



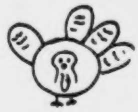
4. ________



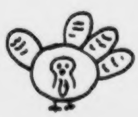
5. ________



6. ________

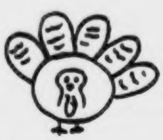


7. ________



8. ________

In all,



______ turkey
math facts

FUN QUIZ

December

1. ______

2. ______

3. ______

4. ______

5. ______

6. ______

7. ______

8. ______

In all,

____ tree
math facts

FUN QUIZ

January

1. ______

2. ______

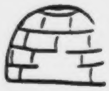
3. ______

4. ______

5. ______

6. ______

7. ______

8. ______


In all,

____ igloo
math facts

FUN QUIZ

February

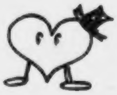
1. ______

2. ______

3. ______

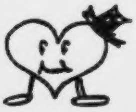
4. ______

5. ______

6. ______


7. ______

8. ______

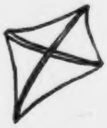
In all,


____ heart
math facts

FUN QUIZ

March

1. ________


2. ________

3. ________

4. ________

5. ________

6. ________

7. ________

8. ________

In all,

____ kite
math facts

FUN QUIZ

April

1. ____________

2. ____________

3. ____________

4. ____________

5. ____________

6. ____________

7. ____________

8. ____________

In all,

____ raindrop
math facts

FUN QUIZ

May

1. ________

2. ________

3. ________

4. ________

5. ________

6. ________

7. ________

8. ________

In all,

____ flower
math facts

Addition 1
Generic

JIFFY QUIZ

Name______________

5			9		6		2
+	+7	+4	+	+3	+	+8	+
3		4	7			6	8
+	+9	+	+	+5	+2	+	+

Name______________

2			3		4	7	
+	+8	+6	+	+9	+	+	+5
	9	5			6	8	
+4	+	+	+7	+3	+	+	+2

Name______________

2		7		4		3	
+	+6	+	+9	+	+5	+	+8
		2		6	9		8
+3	+4	+	+7	+	+	+5	+

JIFFY QUIZ

Name_______________

3			5			7	4
+	+2	+6	+	+8	+9	+	+
	8		6	2			9
+7	+	+3	+	+	+5	+4	+

Name:_______________

4			5	3		7	
+	+9	+2	+	+	+6	+	+8
			9	2		6	
+3	+5	+4	+	+	+8	+	+7

Name:_______________

		4		3	7		8
+2	+9	+	+5	+	+	+6	+
9		5		8			2
+	+6	+	+7	+	+3	+4	+

JIFFY QUIZ

Name______________

2	1	2	7	5	8	3	3
+9	+8	+4	+2	+3	+2	+6	+9
3	6	3	2	4	9	2	4
+7	+2	+8	+3	+1	+3	+5	+3

Name______________

3	5	3	1	3	8	2	7
+4	+2	+9	+4	+2	+3	+6	+3
9	6	2	3	2	4	1	9
+3	+3	+8	+5	+7	+2	+8	+2

Name:______________

7	5	8	3	3	9	8	2
+2	+3	+2	+6	+9	+2	+1	+4
2	4	9	2	4	3	6	3
+3	+1	+3	+5	+3	+7	+2	+8

JIFFY QUIZ

Name_______________

2	9	8	6	2	3	2	0
+9	+3	+0	+3	+8	+5	+7	+9
8	2	7	3	0	5	3	1
+3	+6	+3	+4	+3	+2	+9	+4

Name:_______________

2	7	4	5	8	2	4	9
+9	+2	+0	+3	+2	+5	+3	+3
3	9	2	3	8	6	0	3
+6	+3	+0	+5	+3	+2	+7	+7

Name:_______________

4	8	2	7	3	6	5	3
+1	+3	+6	+3	+9	+0	+2	+4
0	9	2	3	2	6	3	0
+5	+2	+7	+5	+8	+3	+9	+8

Basic Number Facts—Thornton
Book I: Addition & Subtraction

Addition 5
Count Ons, Zeros, and Doubles

JIFFY QUIZ

Name_______________

2 +5	4 +4	8 +3	8 +8	3 +7	1 +8	6 +6	2 +6
5 +3	9 +2	9 +9	6 +2	3 +9	3 +6	2 +7	2 +8
7 +7	2 +9	9 +0	9 +3	7 +2	5 +5	7 +3	3 +8

Name:_______________

3 +5	7 +7	8 +2	9 +2	8 +3	6 +6	2 +7	3 +9
3 +8	4 +4	7 +2	6 +3	7 +3	0 +8	2 +9	9 +9
5 +2	9 +1	9 +3	8 +8	6 +2	2 +8	5 +5	3 +7

JIFFY QUIZ

Name_______________

8	2	5	7	3	5	8	6
+8	+5	+4	+3	+9	+5	+2	+4

7	8	4	2	6	0	6	9
+7	+3	+6	+9	+2	+7	+3	+9

9	9	9	4	3	4	2	6
+2	+1	+3	+4	+5	+5	+7	+6

Name:____________________

7	3	6	8	9	2	7	5
+7	+9	+4	+3	+9	+8	+1	+5

5	5	9	3	6	4	6	9
+2	+4	+2	+8	+6	+6	+2	+3

4	7	8	2	3	8	6	4
+4	+3	+0	+7	+5	+8	+3	+5

JIFFY QUIZ

Name________________

9	5	7	9	6	6	9	4
+5	+5	+9	+9	+9	+6	+8	+9
9	8	8	9	4	5	7	9
+6	+9	+8	+4	+4	+9	+7	+7

Name:________________

9	6	8	9	9	7	4	9
+4	+6	+9	+9	+6	+9	+4	+5
6	7	5	9	5	4	8	9
+9	+7	+9	+7	+5	+9	+8	+8

Name:________________

9	8	4	9	7	9	5	6
+6	+9	+4	+4	+7	+7	+9	+6
7	4	8	6	9	9	5	9
+9	+9	+8	+9	+9	+8	+5	+5

Addition 8
Count Ons, Zeros, Doubles,
10-Frames, and 9's

JIFFY QUIZ

Name________________

9	9	2	8	9	9	4	1
+6	+4	+9	+8	+3	+7	+5	+8
4	8	5	7	0	3	8	5
+4	+9	+2	+9	+9	+9	+2	+9
8	4	3	6	7	7	6	9
+3	+6	+5	+9	+3	+2	+6	+8

Name:________________

4	6	9	3	5	3	6	8
+9	+2	+8	+5	+5	+7	+9	+2
7	8	2	9	7	6	9	9
+0	+3	+9	+5	+2	+3	+9	+7
7	8	9	7	9	9	7	9
+7	+9	+2	+9	+3	+6	+3	+1

JIFFY QUIZ

Name________________

9	2	9	8	6	8	6	7
+4	+9	+7	+8	+4	+9	+1	+2
3	4	5	3	9	2	8	7
+9	+4	+2	+6	+6	+8	+3	+9
5	7	9	3	6	5	7	4
+4	+0	+8	+5	+6	+9	+3	+9

Name:________________

5	4	6	9	7	3	9	2
+9	+5	+2	+8	+7	+6	+4	+7
5	3	6	8	8	3	4	9
+5	+7	+0	+2	+9	+8	+6	+7
2	9	9	5	7	3	9	9
+9	+6	+3	+1	+9	+5	+9	+5

Addition 10
Count Ons, Zeros, Doubles,
10-Frames, and 9's

JIFFY QUIZ

Name________________

5 2 9 5 9 6 3 9
+9 +5 +9 +3 +8 +2 +6 +4

8 1 7 8 5 5 3 6
+2 +4 +9 +3 +4 +5 +9 +9

9 7 7 2 4 6 0 9
+5 +7 +3 +7 +9 +4 +5 +7

Name:________________

9 9 8 6 7 9 9 7
+6 +2 +8 +3 +2 +7 +8 +1

4 4 7 8 6 2 3 6
+0 +5 +9 +3 +6 +8 +7 +9

9 4 5 2 8 4 5 9
+4 +4 +3 +5 +9 +6 +9 +3

Addition 11
Doubles +1 and
Easy Addition Facts

JIFFY QUIZ

Name______________

4	5	6	3	4	5	8	6
+5	+6	+2	+7	+4	+2	+7	+9
8	9	9	0	3	6	7	8
+3	+4	+2	+9	+6	+4	+6	+8
7	6	8	8	7	6	6	9
+1	+7	+2	+9	+8	+6	+5	+3

Name:____________________

1	5	5	6	8	4	3	6
+9	+9	+5	+2	+7	+6	+6	+5
7	3	5	9	7	2	5	0
+6	+8	+4	+7	+7	+7	+6	+8
9	9	3	8	6	3	7	9
+9	+8	+7	+2	+7	+9	+8	+2

Addition 12
Make 10, Add Extra
Facts and Review

JIFFY QUIZ

Name______________

4	7	9	2	8	5	7	8
+8	+5	+3	+8	+5	+4	+4	+8
6	4	9	3	0	7	8	7
+8	+4	+8	+8	+7	+2	+4	+9
1	4	9	5	6	6	5	8
+9	+7	+6	+8	+4	+6	+7	+6

Name:_________________

9	4	8	5	9	6	5	2
+4	+5	+4	+5	+3	+8	+7	+9
8	5	3	7	7	4	0	5
+9	+8	+8	+4	+7	+6	+8	+9
7	7	8	9	4	8	8	4
+1	+5	+6	+9	+8	+2	+5	+7

JIFFY QUIZ

Name________________

4	5	9	2	8	9	7	6
+5	+7	+9	+6	+6	+5	+6	+3

2	5	6	8	9	7	7	4
+8	+8	+9	+7	+3	+4	+2	+4

2	5	3	9	6	8	6	8
+9	+6	+7	+8	+6	+4	+4	+3

Name:______________________

7	2	6	4	5	7	4	5
+8	+6	+5	+9	+5	+3	+8	+4

7	8	8	5	4	8	7	3
+7	+5	+9	+3	+7	+2	+9	+9

7	9	8	3	6	4	8	6
+5	+2	+8	+7	+8	+6	+3	+7

Addition 14
General Review

JIFFY QUIZ

Name_______________

6	8	5	8	4	7	5	9
+6	+6	+4	+7	+7	+9	+8	+3
4	7	0	9	7	5	8	7
+9	+5	+9	+2	+6	+3	+8	+3
6	4	9	3	4	4	5	2
+2	+4	+6	+8	+8	+6	+6	+8

Name:_____________________

7	9	6	4	8	7	6	2
+4	+8	+5	+6	+1	+7	+8	+8
5	5	6	8	3	9	9	7
+9	+5	+3	+5	+8	+6	+2	+8
3	8	7	6	9	4	5	3
+7	+4	+2	+7	+9	+5	+7	+9

JIFFY QUIZ

Name_______________

12	10	9	10	6	9	7	9
-3	-2	-1	-3	-1	-2	-1	-3
8	8	11	10	11	7	7	8
-3	-1	-2	-1	-3	-2	-3	-2

Name:_____________________

11	10	5	11	6	4	9	10
-2	-1	-2	-3	-2	-3	-2	-3
12	10	8	4	9	12	9	6
-3	-2	-3	-2	-3	-3	-1	-3

Name:_____________________

5	8	7	11	5	6	10	3
-3	-2	-3	-3	-2	-3	-1	-2
6	9	10	11	4	9	12	10
-2	-1	-3	-2	-3	-2	-3	-2

JIFFY QUIZ

Name________________

8	9	4	12	5	10	8	9
-8	-1	-2	-3	-0	-2	-2	-3
11	7	6	11	9	9	8	10
-2	-0	-3	-3	-2	-9	-3	-3

Name:______________________

11	9	10	4	7	5	10	12
-2	-0	-3	-2	-7	-3	-1	-3
11	6	10	9	3	8	4	9
-3	-0	-2	-3	-2	-3	-4	-2

Name:______________________

8	4	12	10	8	9	5	11
-2	-0	-3	-2	-3	-2	-5	-3
11	6	5	10	6	5	7	9
-2	-3	-0	-3	-6	-3	-1	-3

JIFFY QUIZ

Name______________

8	7	11	4	9	10	7	12
-3	-2	-2	-2	-3	-2	-0	-3
7	11	8	8	6	7	10	9
-1	-3	-2	-8	-2	-3	-3	-2

Name:____________________

4	10	5	7	5	6	8	11
-2	-3	-0	-3	-2	-2	-2	-3
12	10	9	11	8	7	9	8
-3	-2	-3	-2	-1	-2	-9	-3

Name:______________________

6	10	7	6	10	12	9	8
-2	-2	-3	-6	-3	-3	-2	-3
11	7	3	8	11	9	4	6
-3	-2	-1	-2	-2	-3	-0	-3

JIFFY QUIZ

Name________________

10	18	8	10	8	9	9	7
-2	-9	-3	-3	-4	-1	-0	-3
9	10	6	10	11	8	16	5
-3	-1	-3	-5	-3	-2	-8	-2
9	14	6	7	12	4	11	12
-2	-7	-2	-2	-6	-3	-2	-3

Name:________________

12	8	7	8	18	10	9	7
-3	-4	-2	-3	-9	-2	-1	-3
5	10	6	12	10	4	10	11
-2	-10	-3	-6	-3	-3	-5	-2
9	8	16	4	9	14	11	6
-3	-2	-8	-2	-2	-7	-3	-2

JIFFY QUIZ

Name______________

12	10	7	11	18	7	8	8
-3	-5	-3	-2	-9	-2	-4	-3

4	10	9	14	5	6	8	8
-3	-2	-3	-7	-2	-3	-8	-2

6	10	10	16	5	9	12	11
-2	-1	-3	-8	-3	-2	-6	-3

Name:____________________

7	8	6	10	14	5	8	9
-3	-4	-2	-3	-7	-3	-1	-2

12	7	6	11	16	9	5	18
-3	-0	-3	-2	-8	-3	-2	-9

10	8	12	11	8	4	10	7
-2	-3	-6	-3	-2	-3	-5	-2

JIFFY QUIZ

Name________________

10	9	10	14	8	9	8	10
-5	-5	-6	-7	-3	-4	-1	-7
9	11	9	10	10	9	18	11
-2	-3	-0	-2	-9	-3	-9	-2
10	16	12	10	8	12	10	8
-8	-8	-3	-5	-2	-6	-4	-4

Name:______________________

11	14	10	8	12	11	9	18
-3	-7	-9	-3	-6	-2	-4	-9
9	10	12	10	8	10	9	10
-2	-1	-3	-3	-4	-8	-9	-6
10	9	10	10	9	16	8	10
-5	-5	-7	-2	-3	-8	-2	-4

Subtraction 7
Count Backs, Zeros,
Doubles, 10-Frame Facts

JIFFY QUIZ

Name_______________

18 -9	11 -3	10 -2	10 -5	10 -3	9 -2	10 -1	10 -6
8 -4	8 -2	8 -0	10 -7	9 -3	10 -9	16 -8	9 -4
12 -3	14 -7	8 -3	10 -8	11 -2	9 -5	12 -6	10 -4

Name:____________________

9 -3	14 -7	19 -9	12 -3	8 -4	9 -5	16 -8	11 -2
10 -2	9 -1	8 -2	10 -8	18 -9	8 -3	8 -8	10 -6
10 -7	11 -3	10 -5	10 -3	10 -4	9 -2	12 -6	9 -4

Subtraction 8
Count Backs, Zeros,
Do9ubles, 10-Frame Facts

JIFFY QUIZ

Name________________

10	9	10	8	9	12	10	9
-6	-9	-8	-4	-5	-3	-1	-2

10	8	16	9	10	10	9	10
-4	-2	-8	-3	-2	-7	-5	-5

18	9	11	12	8	10	14	11
-9	-4	-2	-6	-3	-9	-7	-3

Name:________________

12	8	10	12	16	10	8	10
-6	-2	-5	-3	-8	-8	-4	-4

9	10	10	9	11	9	11	18
-3	-9	-2	-0	-3	-2	-2	-9

9	8	14	10	9	10	8	10
-4	-3	-7	-6	-5	-3	-1	-7

Subtraction 9
Count Backs, Zeros, Doubles,
10-Frame and Count Up Facts

JIFFY QUIZ

Name______________

8	9	10	5	12	8	9	8
-5	-8	-7	-5	-9	-4	-5	-6
12	9	8	12	11	11	10	9
-3	-7	-3	-6	-2	-8	-4	-6
10	6	7	9	11	7	16	11
-2	-2	-5	-3	-9	-2	-8	-3

Name:______________

10	9	11	7	8	10	12	8
-6	-7	-9	-4	-7	-5	-9	-5
5	14	9	9	9	6	8	10
-2	-7	-6	-4	-2	-0	-6	-8
11	6	10	6	12	18	11	7
-8	-3	-3	-4	-3	-9	-2	-3

JIFFY QUIZ

Name______________

11	16	7	9	7	6	10	11
-3	-8	-2	-3	-5	-2	-2	-9
8	12	10	9	7	8	9	8
-4	-9	-7	-8	-7	-5	-5	-6
8	9	8	12	5	10	9	8
-6	-5	-4	-9	-5	-7	-8	-5

Name:__________________

8	12	10	8	7	11	9	10
-5	-9	-5	-7	-4	-9	-7	-6
8	9	5	14	9	4	10	9
-6	-4	-2	-7	-6	-0	-8	-2
7	11	18	12	6	10	6	11
-3	-2	-9	-3	-4	-3	-3	-8

Subtraction 11
Count Backs, Zeros, Doubles,
10-Frame and Count Up Facts

JIFFY QUIZ

Name________________

6 -2	9 -3	16 -8	11 -9	10 -2	7 -5	7 -2	11 -3
8 -5	9 -8	12 -9	8 -6	9 -5	7 -7	10 -7	8 -4
9 -8	8 -5	12 -9	10 -7	8 -4	9 -5	3 -3	8 -6

Name:________________

9 -2	5 -2	10 -8	9 -4	14 -7	2 -0	8 -6	9 -6
6 -3	18 -9	7 -3	11 -2	12 -3	6 -4	11 -8	10 -3
10 -6	11 -9	8 -7	12 -9	9 -7	7 -4	10 -5	8 -5

JIFFY QUIZ

Name_______________

9	16	7	16	11	9	11	14
-7	-9	-4	-8	-3	-5	-2	-9
10	12	8	9	7	12	9	10
-3	-6	-2	-6	-3	-9	-3	-6
9	10	11	7	13	12	11	15
-2	-2	-9	-5	-9	-3	-8	-9

Name:_____________________

18	11	8	17	8	10	14	9
-9	-2	-5	-9	-3	-3	-9	-6
9	11	13	9	10	9	11	12
-3	-8	-9	-7	-2	-4	-9	-3
10	15	6	11	12	9	7	16
-4	-9	-2	-3	-9	-2	-4	-9

Subtraction 13
Teen Minuend/Zero
Finger Facts

JIFFY QUIZ

Name_______________

9	12	11	13	15	11	13	11
-7	-9	-4	-9	-6	-9	-8	-3
10	14	17	14	12	11	13	14
-3	-8	-9	-5	-3	-7	-6	-7
11	11	16	12	15	12	12	13
-6	-2	-7	-5	-9	-4	-8	-7

Name:____________________

12	15	11	16	11	15	13	11
-9	-8	-6	-8	-7	-6	-7	-9
12	11	15	14	12	16	10	13
-8	-4	-9	-8	-3	-7	-6	-4
14	11	12	12	14	13	11	13
-9	-2	-5	-8	-5	-8	-3	-9

JIFFY QUIZ

Name______________

18	14	12	13	16	12	11	14
-9	-6	-3	-5	-9	-5	-9	-8
10	12	15	12	12	15	12	11
-2	-4	-9	-4	-8	-7	-8	-2
11	11	15	11	16	12	13	17
-5	-3	-8	-4	-7	-9	-6	-9

Name:________________

10	12	10	13	11	16	13	11
-3	-3	-8	-6	-9	-7	-4	-5
13	13	12	15	13	11	15	12
-9	-8	-4	-8	-5	-3	-6	-9
16	15	11	12	11	16	12	11
-8	-7	-2	-7	-4	-9	-8	-6

JIFFY QUIZ

Name________________

16	11	14	10	15	16	13	12
-9	-2	-8	-6	-9	-8	-7	-9
8	14	9	14	11	13	8	16
-4	-6	-7	-5	-8	-4	-8	-7
10	17	12	13	12	9	11	10
-3	-8	-5	-9	-7	-3	-6	-2

Name:_________________________

10	11	12	15	14	12	15	14
-2	-5	-3	-9	-6	-9	-8	-7
16	6	12	11	13	12	13	11
-7	-6	-7	-9	-8	-4	-5	-3
13	6	15	13	11	16	8	10
-4	-3	-7	-9	-6	-9	-6	-7

Subtraction 16
General Review

JIFFY QUIZ

Name______________

14	8	15	11	13	10	16	12
-5	-6	-7	-2	-5	-8	-8	-9
13	9	15	14	11	7	16	13
-4	-2	-8	-8	-8	-7	-9	-8
10	11	12	11	15	12	11	17
-3	-7	-6	-4	-9	-5	-3	-9

Name:____________________

10	11	17	16	13	9	13	12
-5	-9	-8	-9	-6	-7	-5	-3
14	12	3	13	13	10	15	12
-5	-4	-3	-8	-7	-2	-7	-8
9	11	14	6	12	11	13	11
-3	-7	-8	-3	-4	-5	-9	-6

Appendix B:

Useful Materials for Teaching Basic Facts

- Materials Needed in the Sample Lessons
- Individual Chalkboards: Alternatives to Consider

Materials Needed in the Sample Lessons
Addition

	Time & Again Activities	Count Ons	Zero Facts	Easy 10-Frame Facts	Doubles	Magic 9s	Doubles +1	Other 10-Frame Facts	Notes
1. Flash Cards		✓	✓	✓	✓	✓	✓	✓	
2. Individual Chalkboards		✓			✓	✓	✓		
3. Unifix cubes or other small counters	✓	✓	✓			✓		✓	
4. 10-frame(s)	✓			✓		✓		✓	
5. Dice or spinners									
6. Small cards/ notepaper (sometimes numbered)		✓							
7. Tag Board		✓							
8. Paper sack			✓						
9. Calendar pages (overhead, if possible)						✓			

Materials Needed in the Sample Lessons
Subtraction

	Count Backs	Zeros	Doubles	"10-" Facts	Count Ups	Other Teen Minuend Facts	Notes
1. Flash Cards	✓	✓	✓	✓	✓	✓	
2. Individual Chalkboards		✓	✓	✓	✓	✓	
3. Unifix cubes or other small counters	✓						
4. 10-frame(s)				✓		✓	
5. Dice or spinners							
6. Small cards/ notepaper (sometimes numbered)							
7. Demonstration Clock	✓						
8. Hide & Seek Cards		✓		✓			
9. Scrap paper Masking tape				✓			
10. Count Up Cards					✓		

Individual Chalkboards

Alternatives to Consider

Many activities in the sample lessons of this teacher resource call for individual chalkboards. Teachers have found them most useful, for they can be used to structure activities so that ALL STUDENTS are required to think, then respond. Even students who look to a neighbor for a "hint" in answering are actively engaged in the learning situation! Getting students to think, write, and show responses on their chalkboard is a step above unison response or having students raise hands for one person to respond. The potential for children staying atuned to what is happening and actually staying on task is just increased.

School supply companies and many toy, drug, and grocery stores sell individual chalkboards. In addition, there are other options open to teachers for providing or substituting for commercial slates. These include:

- Using chalkboard paint (available at most hardware stores) on tagboard.
- Using chalkboard Contact® paper (available at many hardware, drug and department stores) on tagboard.
- Using china marker or crayons on plexiglass.
- Using commercial write and "lift up to erase" pads. These come with special writing sticks.
- Using cardboard backing sheets of writing pads. Just "season" the cardboard by rubbing chalk all over it, just as you would on a new chalkboard.
- Letting children just write big on their own notepaper. Teachers are close enough to the children that the writing will be visible.

However answers are provided, teachers can give or elicit from a student the correct response each time. This approach generally makes it unnecessary to single out an individual who may have shown an incorrect response. The main emphasis is promoting children's THINKING and active participation, and providing appropriate oral discussion and feedback.

Suggestions for Care and Storage

Chalkboards or slates, however provided, cost too much in time, money or effort to be mishandled. Still, they BELONG IN CHILDREN'S DESKS—not on a classroom shelf. If they are in the desks they are handy and will be used. If they are not, they tend to be too much trouble or take too much time to distribute at that odd, often unexpected moment when they could make a difference!

One suggestion is to have children pair up for storing. One child sandwiches and stores both chalkboards *slate sides together* to protect them; the other stores the chalk and wipe-off rag. Some teachers use washable rags or handiwipes and store chalk and rag in a ziploc bag. Others have children bring in light-colored socks (on which the chalk dust is not quite so visible and hence less distracting), and instruct children to drop their chalk into the sock before storing it in a ziploc bag. From time to time, the rags or socks can be collected and washed.

Appendix C:

Card Sets for the Basic Fact Program

- Using the Card Sets
- Card Sets

Using the Card Sets

Ten card sets are contained in this section:

- 10-Frame Cards (7 cards)
- Picture Cards for Addition Doubles (9 cards)
- Doubles +1 Picture Cards (3 Cards)
- Super Star Addition Cards (5 Cards)
- Say and Check Cards for Subtraction Doubles (8 Cards)
- 10-Frame Say and Check Cards (6 Cards)
- Subtraction Count Up Cards (9 Cards)
- Subtraction/Add to Check Flash Cards (25 Cards)
- Finger Flash Card Sample/Pattern (1 Card)
- Blank Gamepath with Chance Cards (2 Cards)

The card sets are introduced and used in the sample addition and subtraction lessons contained in this resource. Full details for their use are contained in the lesson(s) in which they are used. The following comments summarize their use in teaching and learning basic addition and subtraction number facts.

1. **10-Frame Cards.** 10-frame "flash" activities can be started during early number work with numbers 0-10 and be reviewed regularly (several times each week) with other groups of children who have not yet mastered all 100 addition and all 100 subtraction facts. To wait until children already are working with addition and subtraction facts is "too late." Children need to be able mentally to picture the 10-frame if it is to be useful in fact work, and the mental imagery takes time to develop.

   Take the time to develop mental imagery in association with the 10 frame. Doing so can help beginners avoid finger counting for 4 + 6, 4 + 5, and all "Easy 10-Frame" addition and subtraction facts. The frame can also be used to help with harder addition facts (e.g. 7 + (4,5) 8 + (4,5,6); and all subtraction facts with teen minuends.

   10-Frame Flash: "How many did you see in the frame?" Work especially for instant sight recognition of four to nine dots in the frame. "When the first row is full -- that's five. We can count on from there to tell the number when six to nine dots are in the frame. When the whole frame is full, that's ten dots."

It is useful to let children put counters into their own, individual 10-frames. They would fill the frame left-right (to reinforce the left-right reading motion), top row first. For subtraction, "take away" objects in the reverse order.

Frame Fill. Flash the cards with four to nine stars. "How many stars do you see?" (Write the number.) "How many empty spaces?" (Write that number.) THEN SHOW THE CARD AGAIN so children can check. (Sample comment: "Yes, 4 and 6—that makes 10.") Children should first use the 10-frame to get answers. The next step is to challenge students to write answers first, then use the frame afterwards to check that what is written is correct.

Extend to 10-sums and 4 + 5, 5 + 4. Repeat activity similarly to Frame Fill, but each time have students write the addition fact that matches the discussion. Also, tape 10-frame picture cards on the wall or place them along the chalk ledge. Show one of the fact cards (e.g., 4 + 5 or 4 + 6) and ask individual students (perhaps as they leave the room) to say the answer and then match it to the 10-frame picture that checks. Get children to note that 4 + 5 is "all but one" in the 10-frame (9).

The 10-Frame and Subtraction from 10. Show students the 10-frame with 10 stars. "How many stars do you see?" (10) Write 10 on your paper. Now take a good picture with the camera of your eyes. Do you see the ten stars? ... Close your eyes. Do you still see the ten stars? ... Wipe out four in the bottom row. How many are in the frame now? (6) Open your eyes, let's check. Also get students to write the subtraction that models what was done (10 - 4 = 6). Continue for other "10-" facts.

For 9 - 5, ask children to inspect the card with five stars, 4 flowers. "Nine take away the four flowers is ?" (4); "Nine take away the five stars is?" (5).

Extend to harder addition facts: Use the frame to illustrate the strategy: "Make 10, count extra." The larger addend is represented inside the frame, the other addend outside. For 6 + 8, for example, children can put eight counters in the individual 10-frame, and place six counters outside the frame. Then children can move two of the six in the frame to fill it ("make 10"), and add in the four extra outside the frame: 14.

Extend to harder, teen minuend subtraction facts. Use the frame to make sense of the idea: "Subtract from 10, then add the extra." (See the Zero Finger Subtraction Lesson) For 13 - 5, for example, children first fill the 10-frame and place three objects outside the frame to represent

13. We will now subtract five. To start, subtract from 10 (take five (5) objects out of the 10-frame. That leaves five in the frame, and three outside -- or eight in all. (13 - 5 = 8).

2. **Doubles Cards.** Use to develop mastery of addition and subtraction doubles (and later of multiplication and division 2s).

   Use real objects before using the cards with pictured objects. Carry out activities which, in a "hands on" manner, meaningfully relate each picture to a written doubles fact. (Unless you help children "relate" to the pictures, they will be useless.) Trace around children's fingers, write "5" inside each hand picture for the five fingers, ten in all on both hands. Show students real egg cartons and demonstrate the way a half dozen is split off (NOT in 2 rows of 6—the eggs would spill out!).

   Select a calendar page on which the first of the month is a Sunday. Laminate it and allow students to circle and count (if necessary) the seven days in each week—14 in all; ...) If possible, require 16 crayons in lower grades—or get a 16-crayon box yourself and make it "special"; allow students to play dominos and be use they recognize domino 9 configuration;

   - Introduce a few pictures a day rather than all on the same day.
   - With older learners, use pictures only as needed to help with harder doubles.
   - Provide lots of "match" activities: picture to fact; and fact to picture—prior to drill for speed.
   - Create a bullentin board of doubles. Some teachers make theirs "within reach" of children: (1) show fact and picture; (2) hide picture under fact, so child can lift the fact for picture help as needed. Students write or match answer cards to facts.

3. **Doubles +1 Cards.** Use especially to develop mastery for 5 + 6, 6 + 7, 7 + 8 (and turnarounds).
   a. Display (along chalk ledge, on bullentin board) the doubles facts and pictures. One at a time give students the picture for one of the D + 1 facts. "Tape it on top of (under) the 'matching' double." (Example: Students will be led by the picture for 6 + 7 to 6 + 6.)

      Discuss the two pictures: how they are alike and how different (e.g. 1 extra egg in 6 + 7). Have students write the fact illustrated in the new picture (6 + 7). Emphasize that since 6 + 6 is 12, 6 + 7 will be 1 more (13) —students count on from 12, not from 6 or 7.

   b. Repeat a, but this time tape the fact and related picture card back to back and give it to students fact side up. (They can use the back side as a hint, if needed.)

c. Repeat **b**, but this time remove the doubles picture from the display, so that students are required to match written facts, a Double +1 to a Double, and tell the answer to both.
d. Practice the strategy: Write the answers to Doubles +1 facts, then use the pictures to check.

4. **Super Star Addition Cards.** These cards form small decks of playing cards to reinforce the addition strategies. Children follow the rules of three familiar card games:

- Concentration: Match picture or hint to the fact and *say* answer; match fact to answer.
- Super Star: Use "Old Maid" rules to make matches similar to those made in Concentration, using a Super Star card as the odd card with no mate.
- Fish: Make "books:" picture or hint, fact, answer.
  Examples of books:

Book 1 (4 cards)	Book 2 (6 cards)
6+6, 6+7 fact cards. 12, 13 answer cards.	6+6, 6+7 fact cards. 6+6, 6+7 picture cards. 12, 13 answer cards.

Each time as books are laid out, the player should say the answer(s) to the number facts involved.

5. **Say and Check Cards for Subtraction Doubles** – can help students quickly master subtraction Doubles because they use familiar pictures from addition. The cards also can reinforce/help develop children's ability to "add to check" subtraction answers.

Introduce as below, but have students answer *orally* the first few times. Show the whole picture on the card.

Hide all: "How many eggs did I hide?" (12). Have students write the number (e.g., **12 eggs**). Open one flap: "How many eggs did I take out of hiding?" (Children write 12 - 6). "How many eggs are still hidden?" Children complete the equation: 12 - 6 = 6)]. In subsequent lessons and activities, children can use the cards (1) to get answers; (2) to write first then check that written subtraction answers "make sense"; (3) to write the addition fact that checks the answer to a subtraction Double.

6. **10-Frame Say and Check Cards.** These cards are similar in format and use to the Say and Check Cards for Subtraction Doubles. They build the 10-Frame Flash and Frame Fill imagery, and lead to quick memorization of 10

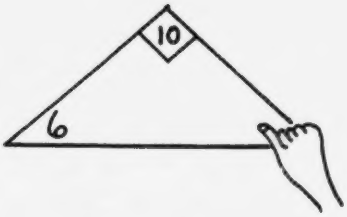
(any number); 9 - 5 (nine, wipe out the row with five); and 9 - 4 (nine, wipe out the row with four).

Show the card with seven stars, three doughtnut shapes, for example: "How many are in the frame?" (10). Close both flaps. "How many did I hide? (10). Write the number. Unfold the "7" flap. How many stars did I take away from hiding? (7). Write to show what I did. (10 - 7). "How many are still in hiding?" (3) "Write it." (10 - 7 = 3) Peek to check.

7. **Subtraction Count Up Cards.** The direction of the arrow, the tone of the teacher's voice - all cue the child to start with the part they know in the subtraction problem, and count up from there. For 12 - 9, for example, ask children what "part" is known (9). Immediately continue the count: "10, 11, 12. I said three numbers, so the answer is three." Eventually switch roles with children. You say the known part (9), and let children count on from there to determine the answer (the number of numbers said).

8. **Subtraction/Add to Check Flash Cards.** These cards are used extensively throughout the lessons. In the subtraction lessons, students say what they think is the subtraction answer, then flip and use add to check. The use of these cards, supported by other adding to check activities in the Subtraction lessons, is considered extremely useful for helping children develop an understanding of and actually using the subtraction-addition relationship in number fact work.

9. **Finger Flash Cards.** These cards are used to reinforce the subtraction-addition relationship, as well as the relationship between related subtraction like 10 - 6 and 10 - 4. They also can be used to reinforce the "family of facts" idea. The sample card may be used as a blackline master to create additional cards. The Add to Check, Partner, and Family activities in the Subtraction lessons provide specific details on using the cards. One sample use is illustrated below.



10 - 6 = 4

because 6 + 4 = 10.

(Lift finger to check.)

10. **Blank Gamepaths with Chance Cards.** Blank gamepaths are best used for practice, and are referenced in several addition and subtraction Speed Up activities in the sample lessons of this resource. The following sample game directions illustrate how they might be used, at school or at home.

Sample Game Directions: Safari
A Practice Game for Addition and Subtraction Number Facts

Need: Safari Gamepath and Chance Cards, cardboard spinner (see pattern below—child pokes pencil through center hole and spins like a top); game marker for each player, paper and pencil to tally points earned during play; deck of cards with facts needing practice. It is possible for each student to have a different deck of cards during play.

To Play (with 2-3 students):

1. Mix the chance cards and put them in a pile, face down on the gameboard. Then mix the fact cards and put them in a pile, face down. Put all game markers on **Start**.

2. Each player draws a card and tells the answer. Player with the highest answer goes first.

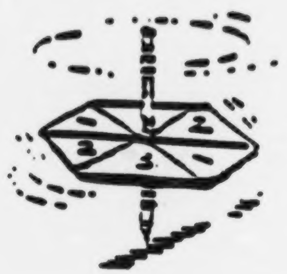
3. In turn, players draw a card and tell the answer. Use answer key or calculator to check when necessary.

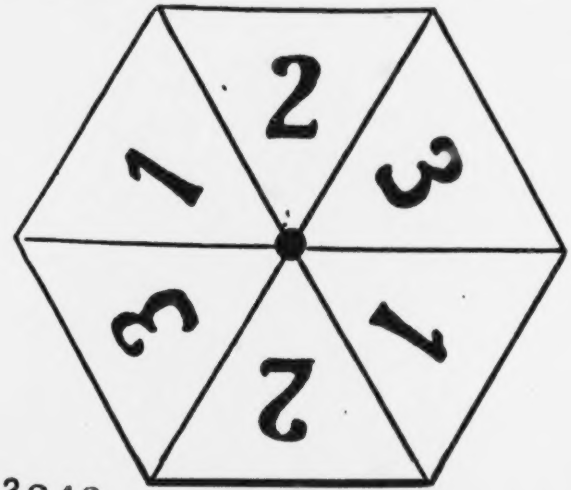
   *If wrong, take a "tread water." Move off the gamepath, just beside your space. Keep the card and study it. Give correct answer and get back on the gamepath at your next turn.

   *If correct, put card in the discard pile. Then spin and move that many spaces.

4. First to reach **Finish** wins the round. Mix the cards and play again.

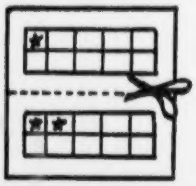
5. Winner of game: Player who has won most rounds when time is called.





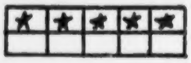
10-Frame Cards

Cut cards in half.



Cards containing 1 to 10 stars are used for:

- **10-Frame Flash**
  (Hold frame horizontal. Flash for a brief moment. Children tell the number seen.)



- **Frame Fill**
  As follow up to 10-Frame Flash, children tell the number needed to fill the frame (preparation for 10 sums.)

Blank 10-frames are used by individuals in the:

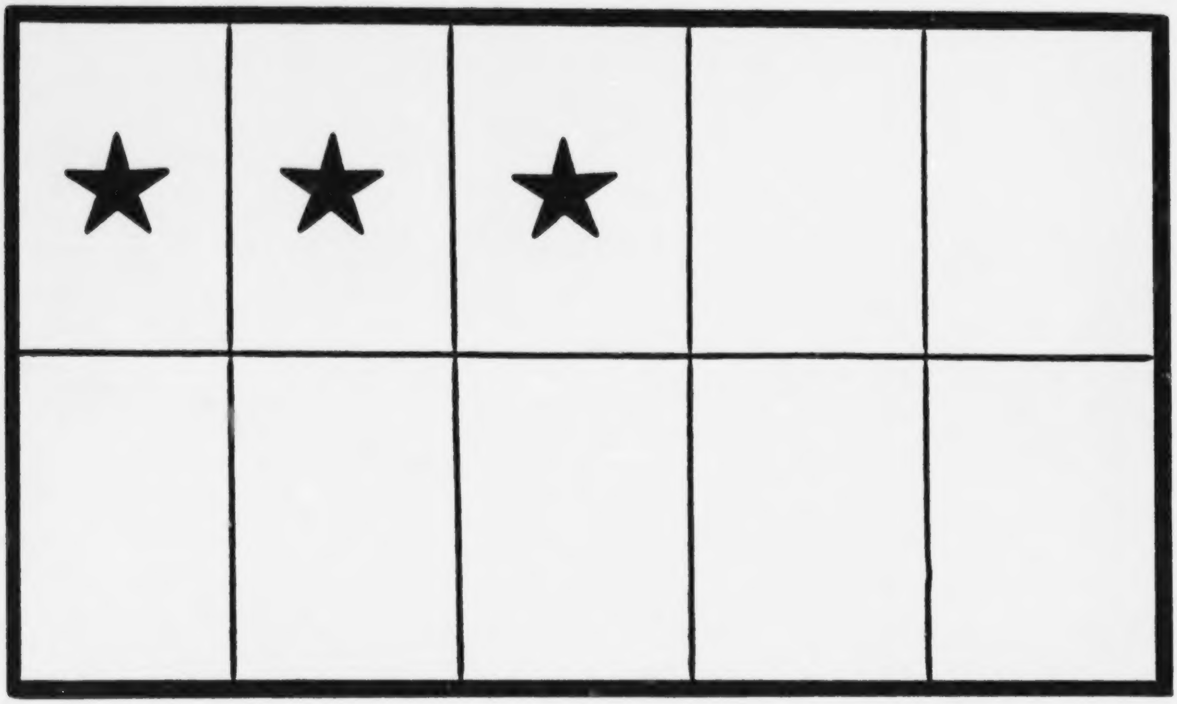
10-Frame Facts Magic 9's Make 10, Add Extra	ADDITION lessons	10-Frame Facts Zero Finger Facts	SUBTRACTION lessons

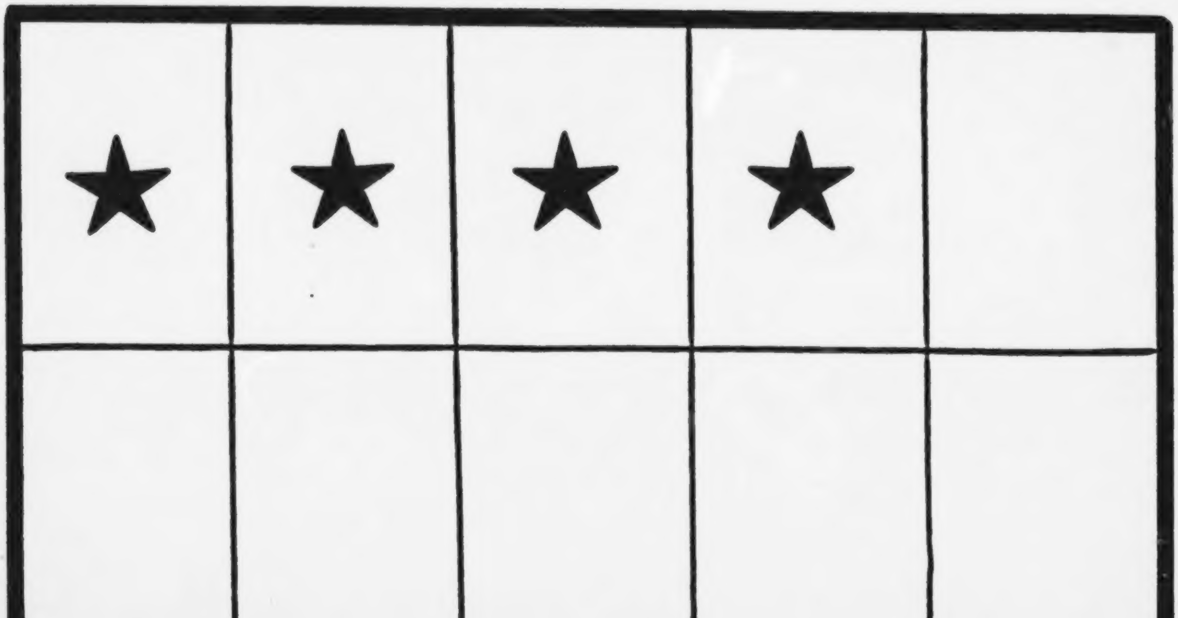
Children use counters in these "individual 10 frames." The sample (large and small size) may be used as blackline masters to provide additional copies.

The last card illustrates 6 + 4 / 4 + 6 and 5 + 4 / 4 + 5 ("all but one" in the 10 frame). Color the four objects in each of these frames a bright, contrasting color.

★				

★	★			





★	★	★	★	★
★	★			

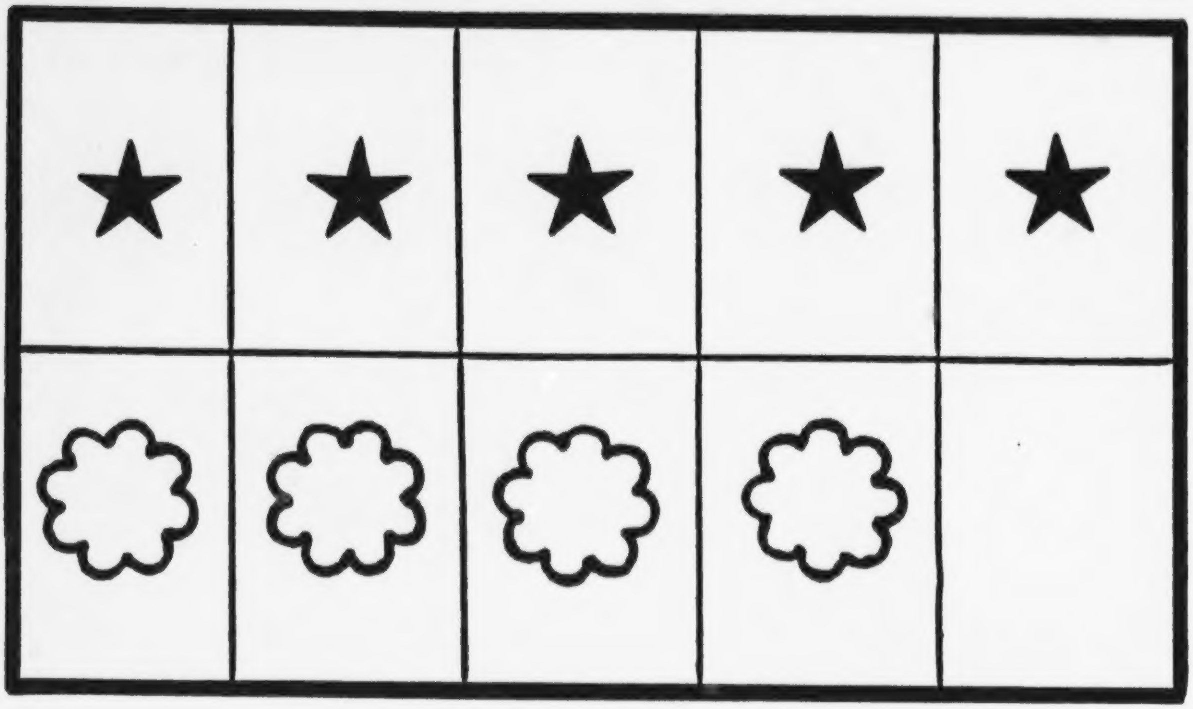
★	★	★	★	★
★	★	★		

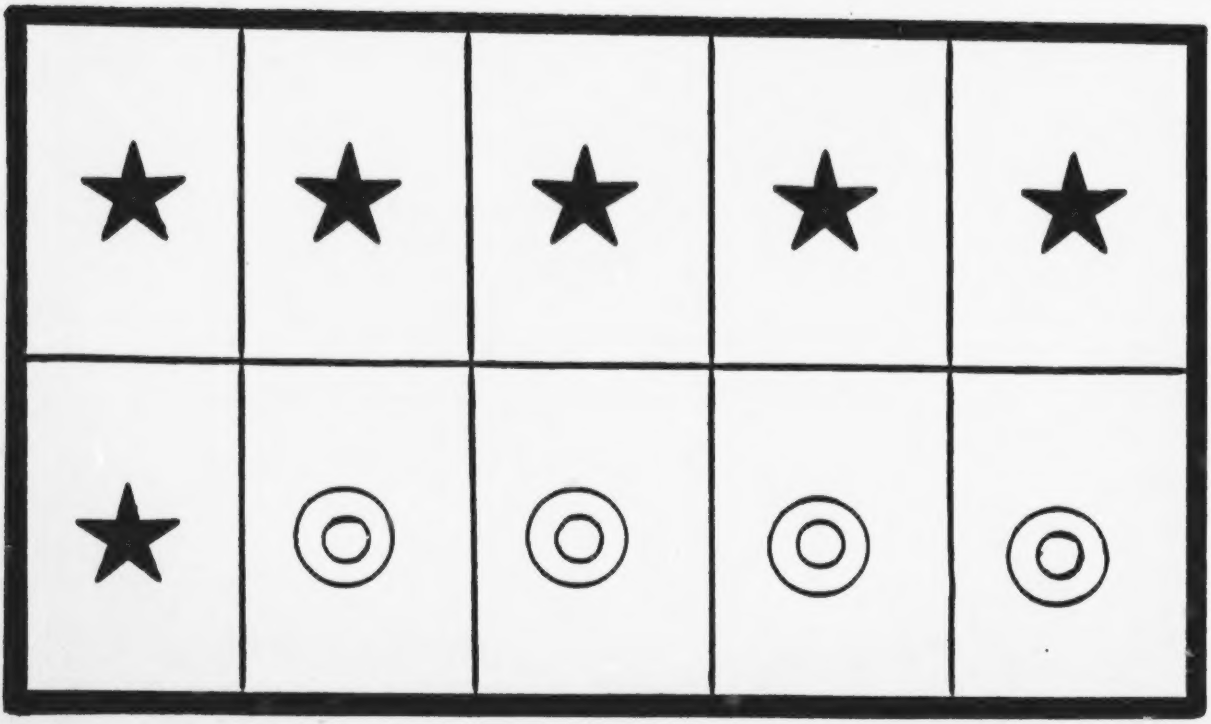
★	★	★	★	★

★	★	★	★	★
★				

★	★	★	★	★
★	★	★	★	★

	★	★	★	★
★	★	★	★	★



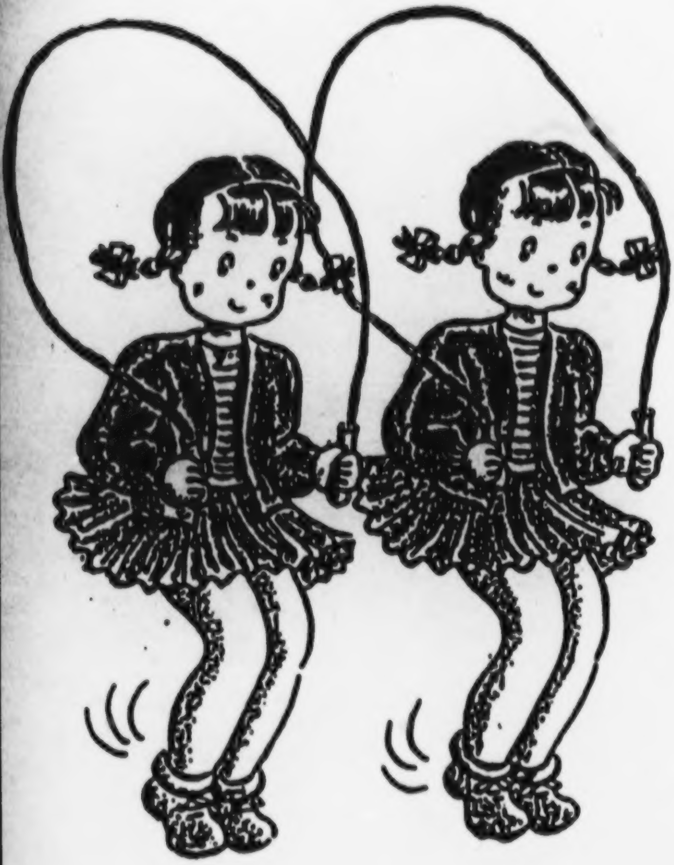


Picture Cards for Addition Doubles

Cut cards in half to create two sets:

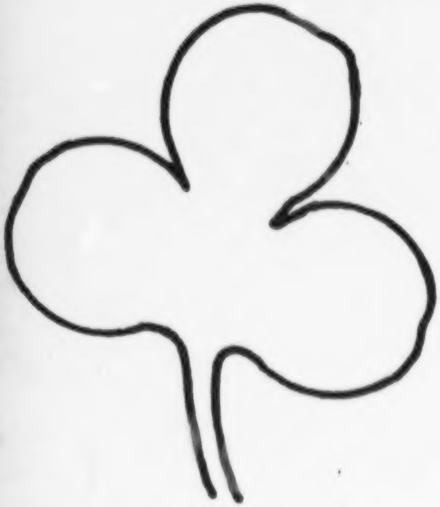
- Picture Cards,
- Number Fact Cards.

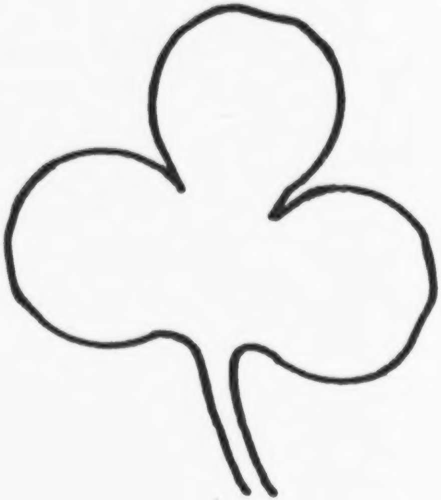
These cards are used in the Doubles and Doubles + 1 addition lessons.



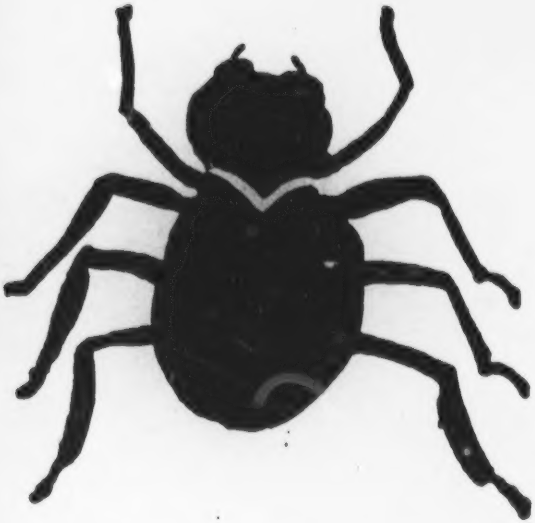
$$\begin{array}{r} 1 \\ +\;1 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \\ +\ 2 \\ \hline \end{array}$$

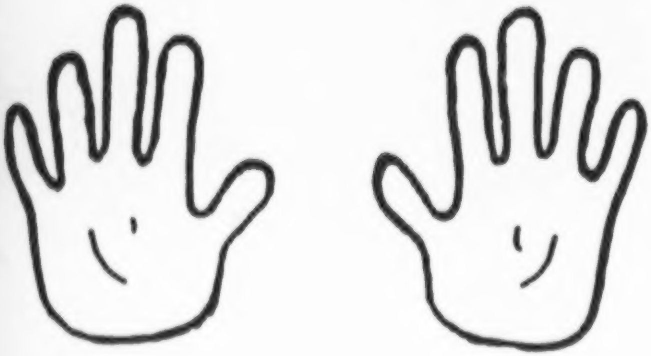




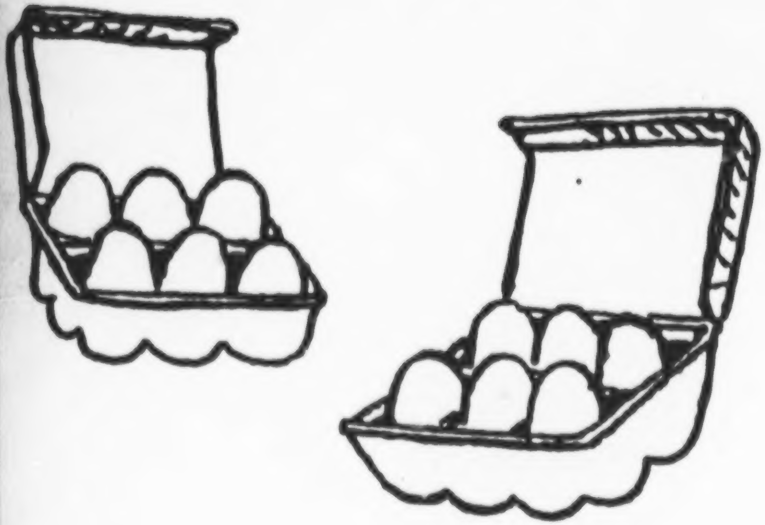
$$\begin{array}{r} 3 \\ +\ 3 \\ \hline \end{array}$$



$$\begin{array}{r} 4 \\ +\ 4 \\ \hline \end{array}$$



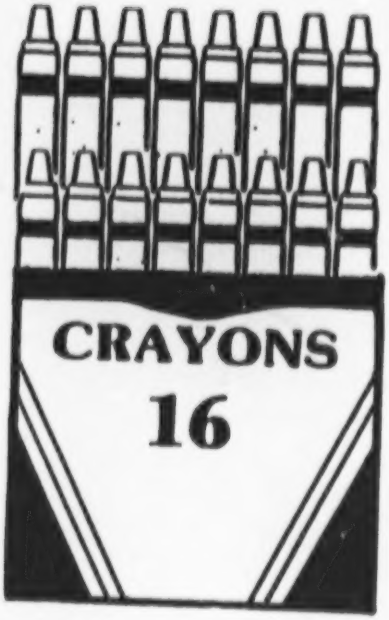
$$\begin{array}{r} 5 \\ +\ 5 \\ \hline \end{array}$$



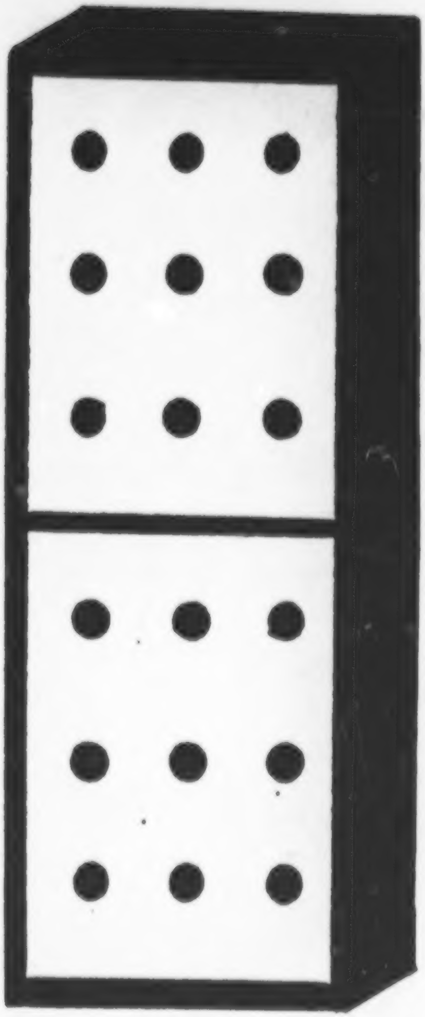
$$\begin{array}{r} 6 \\ +\ 6 \\ \hline \end{array}$$

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

$$\begin{array}{r} 7 \\ +\ 7 \\ \hline \end{array}$$



$$\begin{array}{r} 8 \\ +\ 8 \\ \hline \end{array}$$



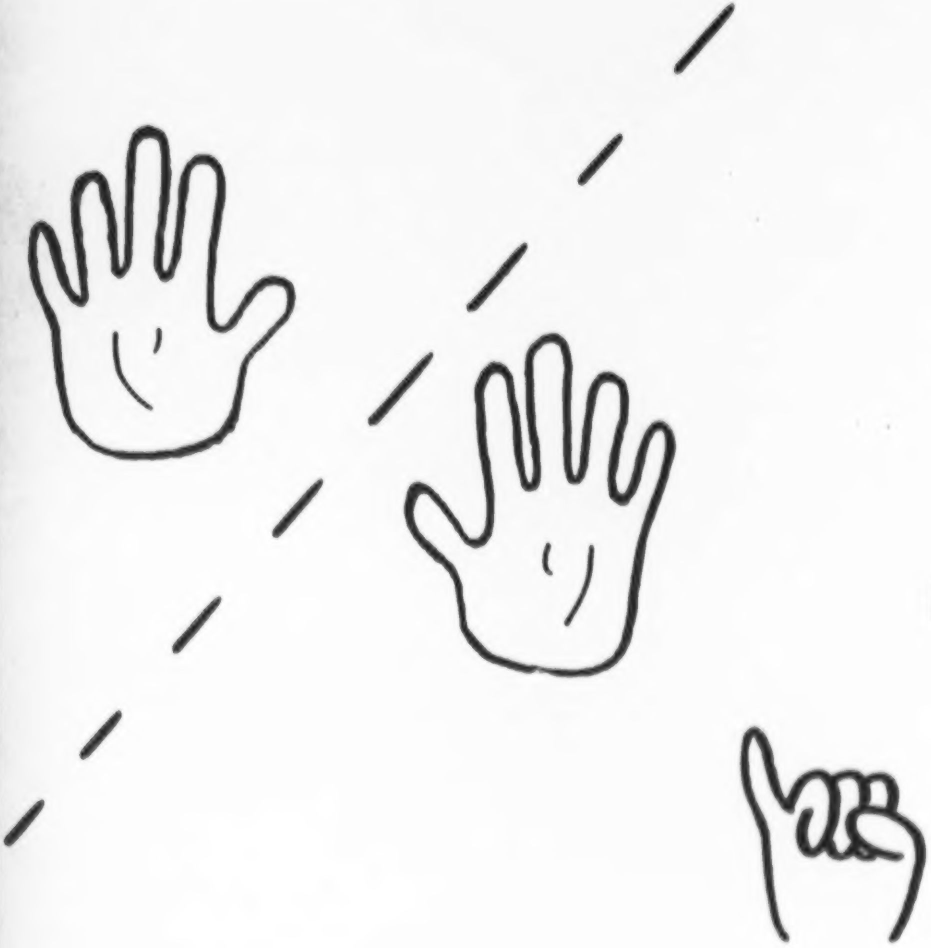
$$\begin{array}{r} 9 \\ +\ 9 \\ \hline \end{array}$$

Doubles + 1 Picture Cards

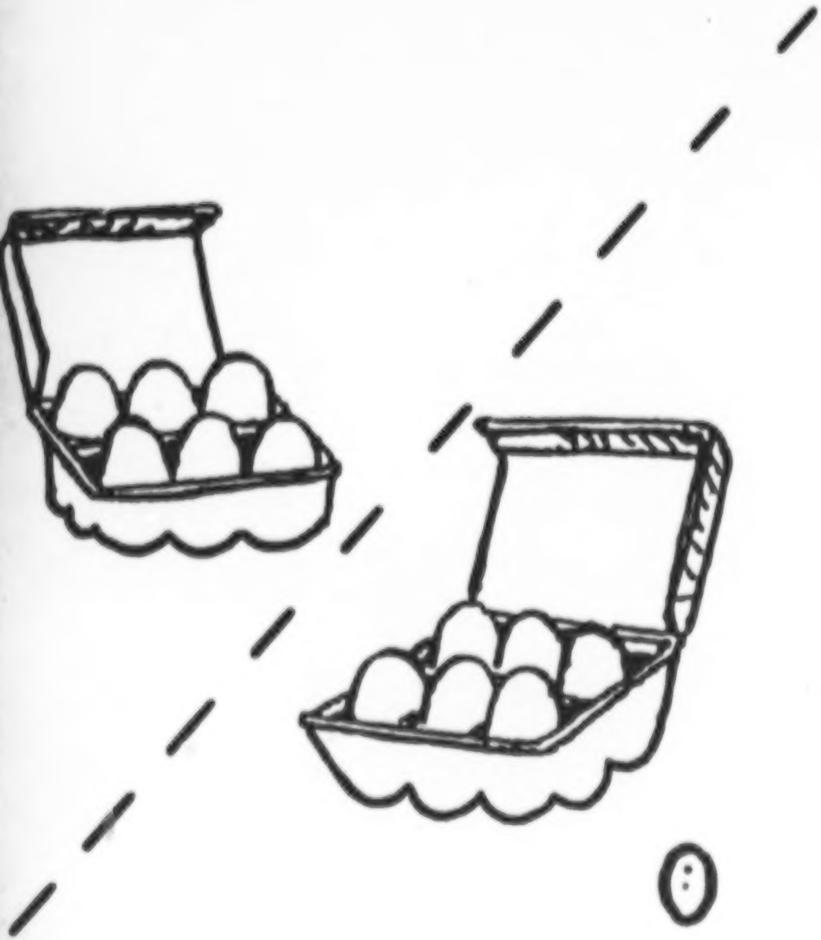
Cut cards in half to create two sets:

- Picture Cards;
- Number Fact Cards.

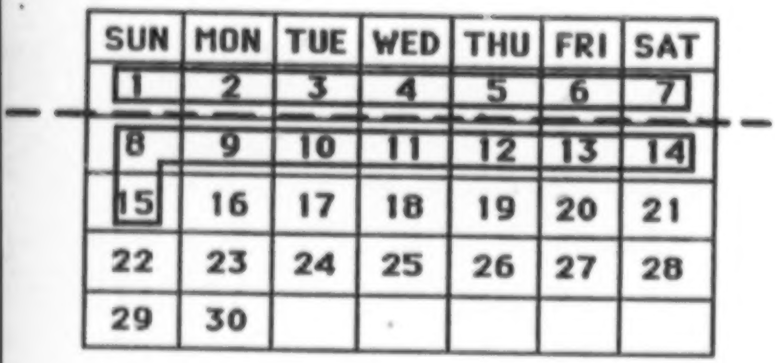
These cards are used in the Doubles + 1 addition lesson.



$$\begin{array}{r} 5 \\ +\ 6 \\ \hline \end{array}$$



$$\begin{array}{r} 6 \\ +\ 7 \\ \hline \end{array}$$



SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

$$\begin{array}{r} 7 \\ +\ 8 \\ \hline \end{array}$$

Super Star Addition Cards

Cut into playing cards for or small group activity.

Separate sets can be formed for:

- Doubles: pictures, facts, answers;
- Doubles +1: pictures, facts, answers;
- Magic 9s: facts, answers;
  (with extra Super Star cards).

Three "familiar" games can be played:

- **Concentration**
  Match picture or hint card to fact and say answer; match fact to answer.

- **Super Star**
  Use "Old Maid" rules to make matches as in Concentration, using one Super Star card as the odd card with no mate.

- **Fish**
  Make "books:" picture, fact or hint cards and matching answers. Each time, SAY the answer.

Super Star

15

Pattern can help

9
+ 6

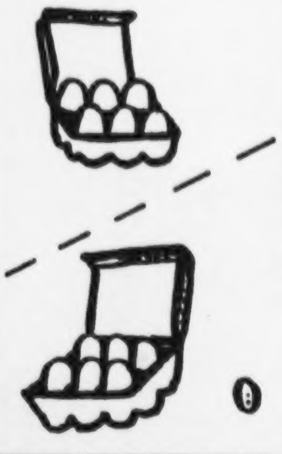
6
+ 7

7
+ 8

Super Star

6
+ 7

7
+ 8



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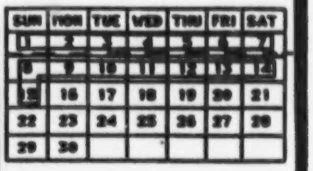
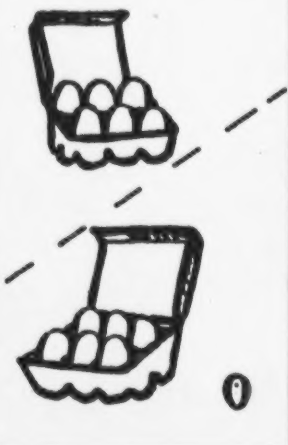

SUN MON TUE WED THU FRI SAT
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30

Super Star



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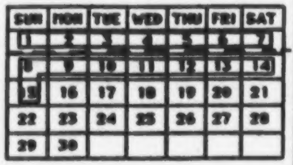

SUN MON TUE WED THU FRI SAT
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30

13

15

9
+ 7

Pattern
can help

7
+ 9

16

Pattern
can help

4
+ 9

13

Pattern
can help

9
+ 5

14

Pattern
can help

6
+ 9

15

Pattern
can help

9
+ 8

17

14

Pattern can help

8
+ 9

17

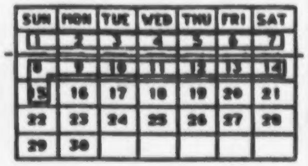
7
+ 7

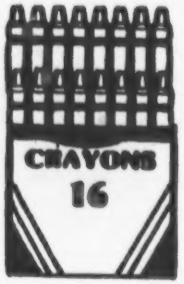
8
+ 8

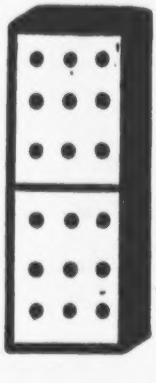
9
+ 9

Super Star

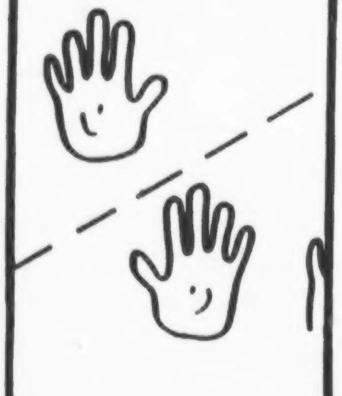
5
+ 6


SUN MON TUE WED THU FRI SAT
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30





Super Star



13

Pattern can help

$\begin{array}{r} 9 \\ +\ 4 \\ \hline \end{array}$

Pattern can help

$\begin{array}{r} 5 \\ +\ 9 \\ \hline \end{array}$

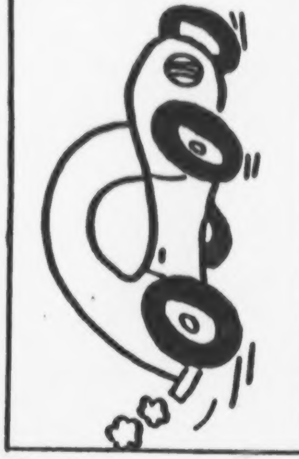
$\begin{array}{r} 2 \\ +\ 2 \\ \hline \end{array}$

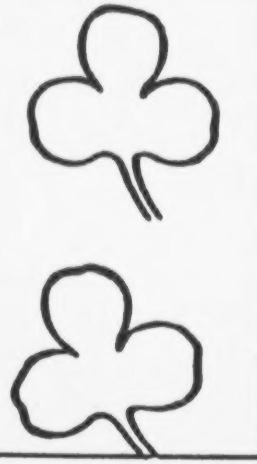
$\begin{array}{r} 3 \\ +\ 3 \\ \hline \end{array}$

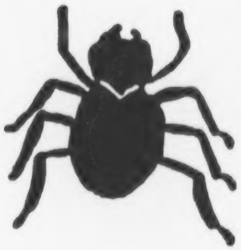
$\begin{array}{r} 4 \\ +\ 4 \\ \hline \end{array}$

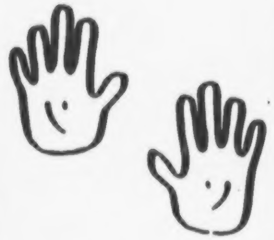
$\begin{array}{r} 5 \\ +\ 5 \\ \hline \end{array}$

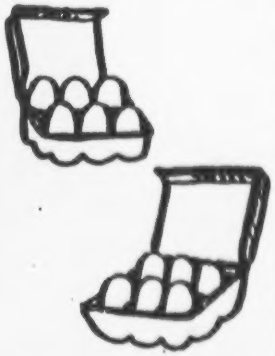
$\begin{array}{r} 6 \\ +\ 6 \\ \hline \end{array}$

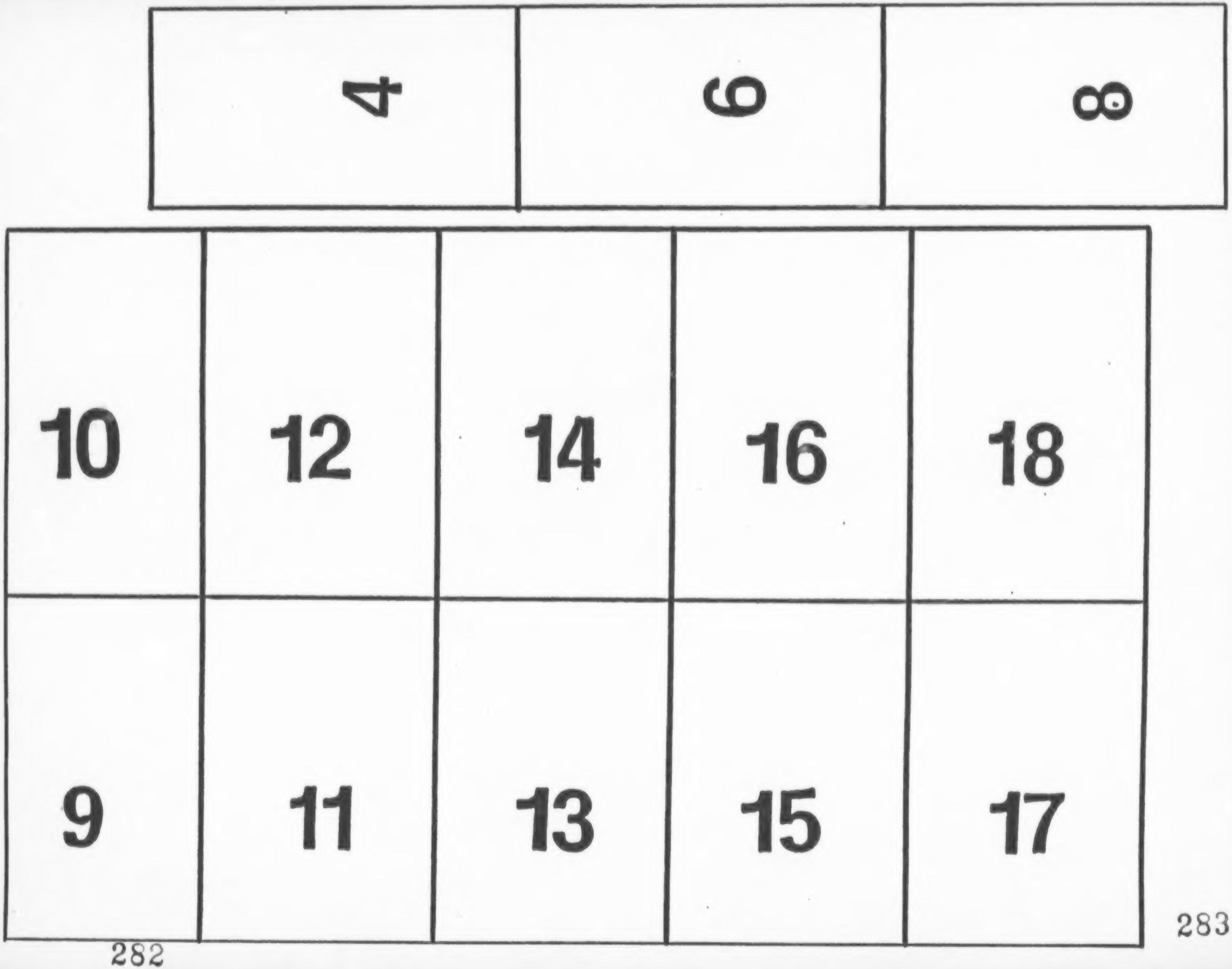












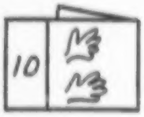
Say and Check Cards for

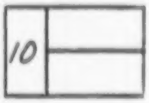
Subtraction Doubles

Cut on the dotted line and fold over to hide the picture.

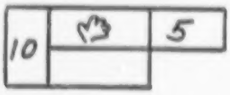
These cards are used in the Subtraction Doubles lesson.

"How many fingers?" (10)





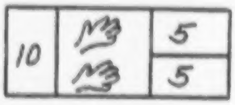
Hide all. "How many
fingers did I hide?" (10)
"Write the number." . . . . (10)



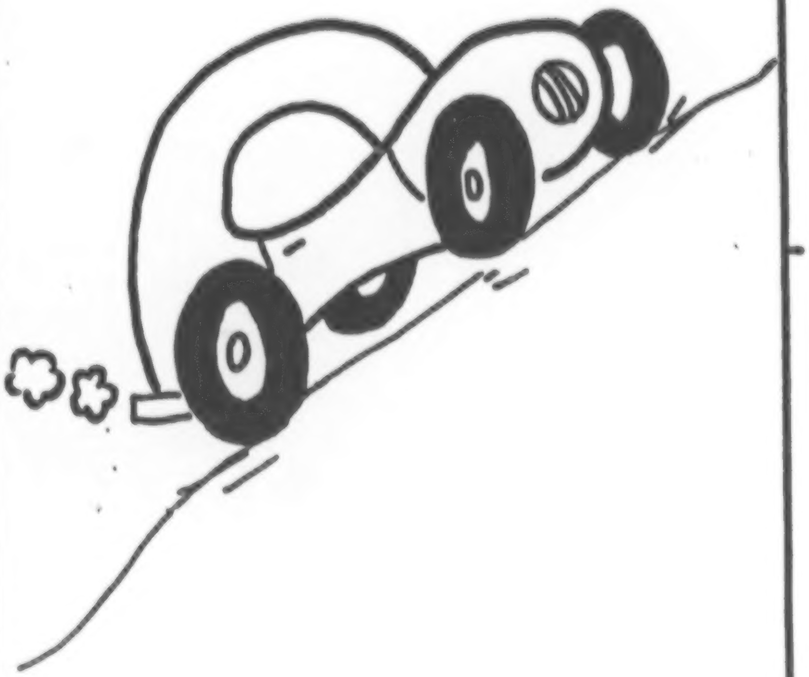
"How many did I take
away from hiding?" (5)
"Write to show what I
did." . . . . (10 - 5)

"How many are still in
hiding?" (5)
"Write it" . . . . (10 - 5 = 5)

"Peek to check."



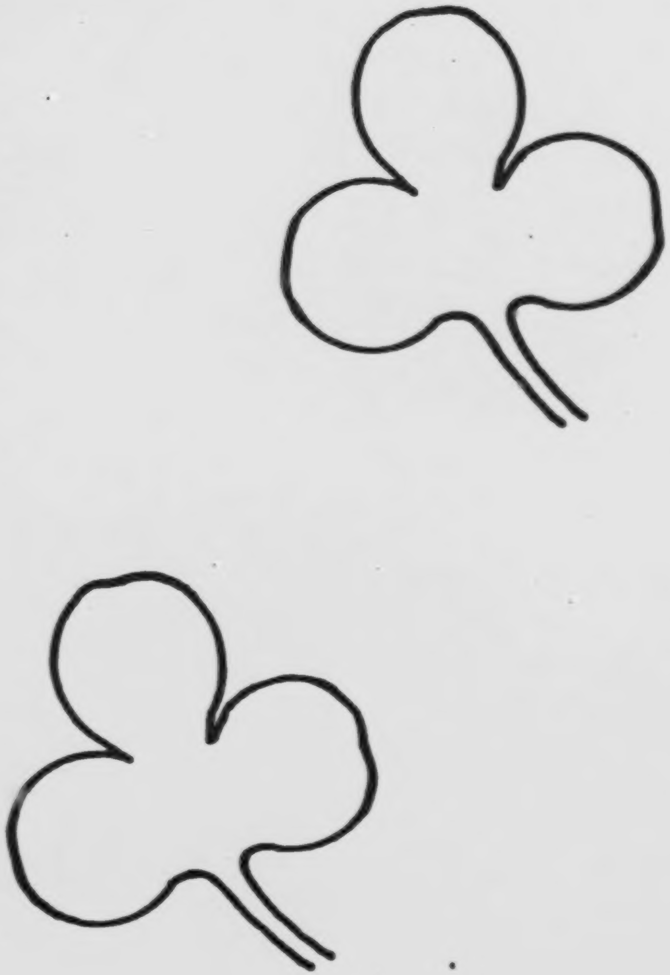
4



2

2

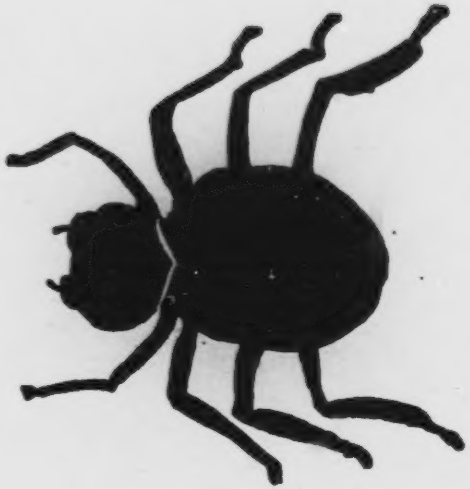
6



3

3

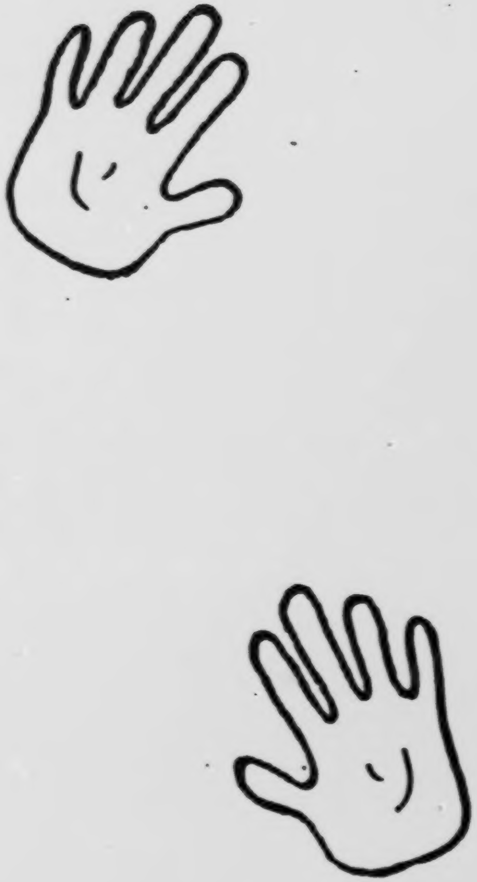
8



4

4

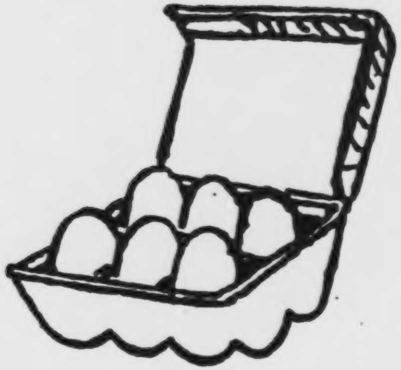
10

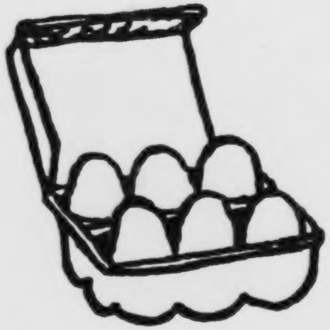


5

5

12





6

6

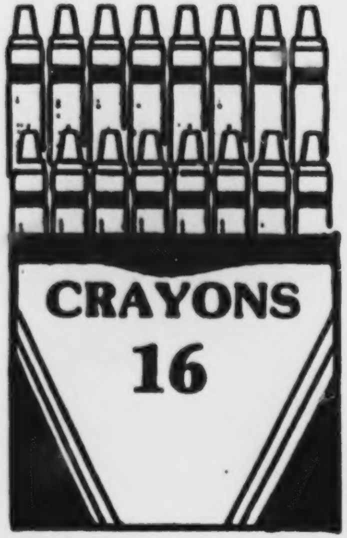
14

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

7

7

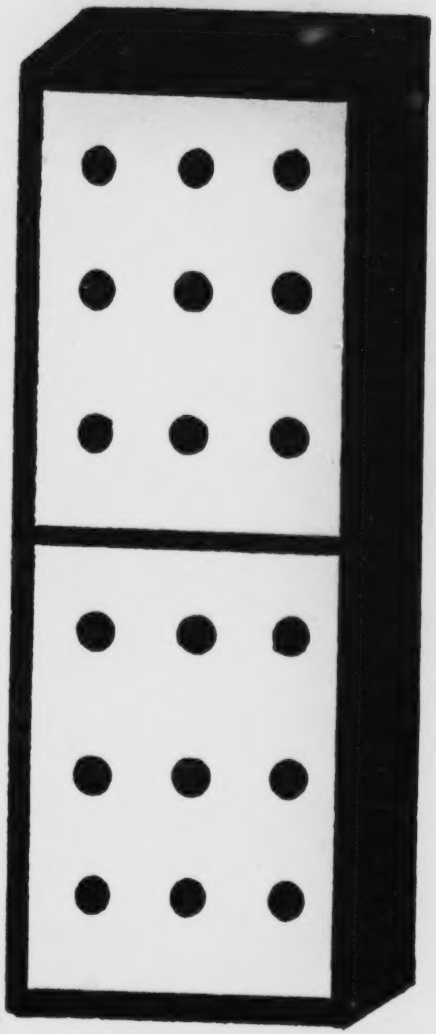
16



8

8

18



9

9

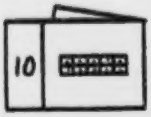
10-Frame Say and Check Cards

Cut on the dotted line and fold over to hide the picture.

These cards are used in the Subtraction 10-Frame Facts lesson.

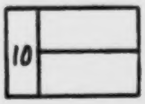
Color the doughnut shapes in each frame a bright contrasting color.

"How many are in the frame?"

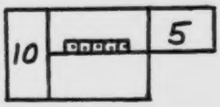


(10)

Hide all. "How many did I hide?" (10)
Write the number



(10)



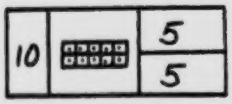
"How many did I take away from hiding?" (5)
"Write to show what I did."

(10 - 5)

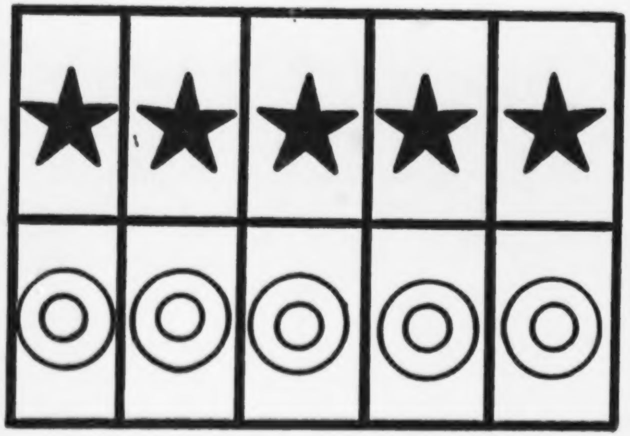
"How many are still in hiding?" (5)
"Write it."

(10 - 5 = 5)

"Peek to check."



10



5

5

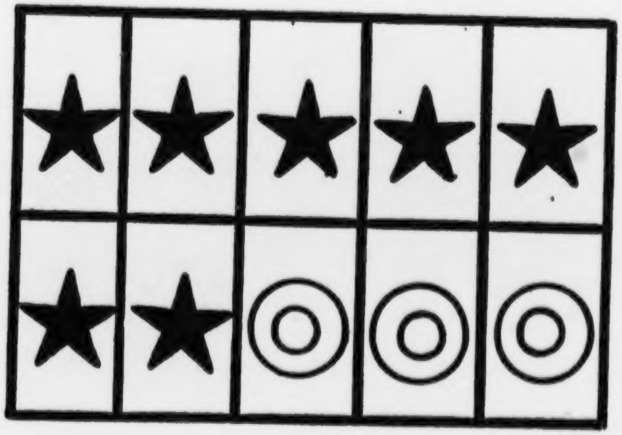
10

★	★	★	★	★
★	◎	◎	◎	◎

6

4

10



7

3

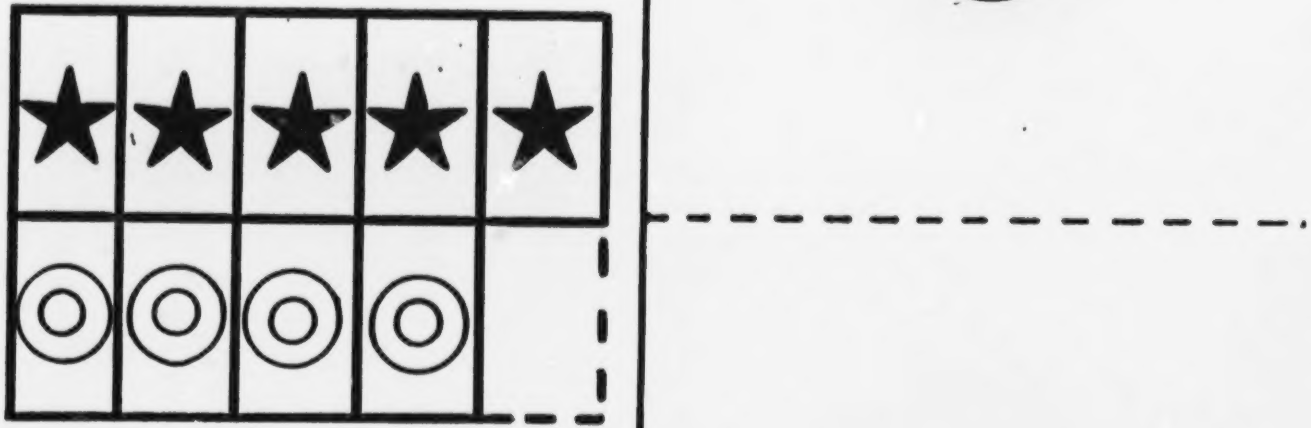
10

★	★	★	★	★
★	★	★	◎	◎

8

2

9



5

4

10

★	★	★	★	★
★	★	★	★	◎

9

1

Subtraction Count-Up Cards

Cut out the arrow flash cards.

These cards are used in the subtraction Count-Up lesson.

They cue children to start with the part they know and count up.

$$\begin{array}{r} 8 \\ -\ 7 \\ \hline \end{array}$$

Good Count Ups

$$\begin{array}{r} 8 \\ -\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ -\ 7 \\ \hline \end{array}$$

Good
Count
Ups

$$\begin{array}{r} 9 \\ -\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ -\ 5 \\ \hline \end{array}$$

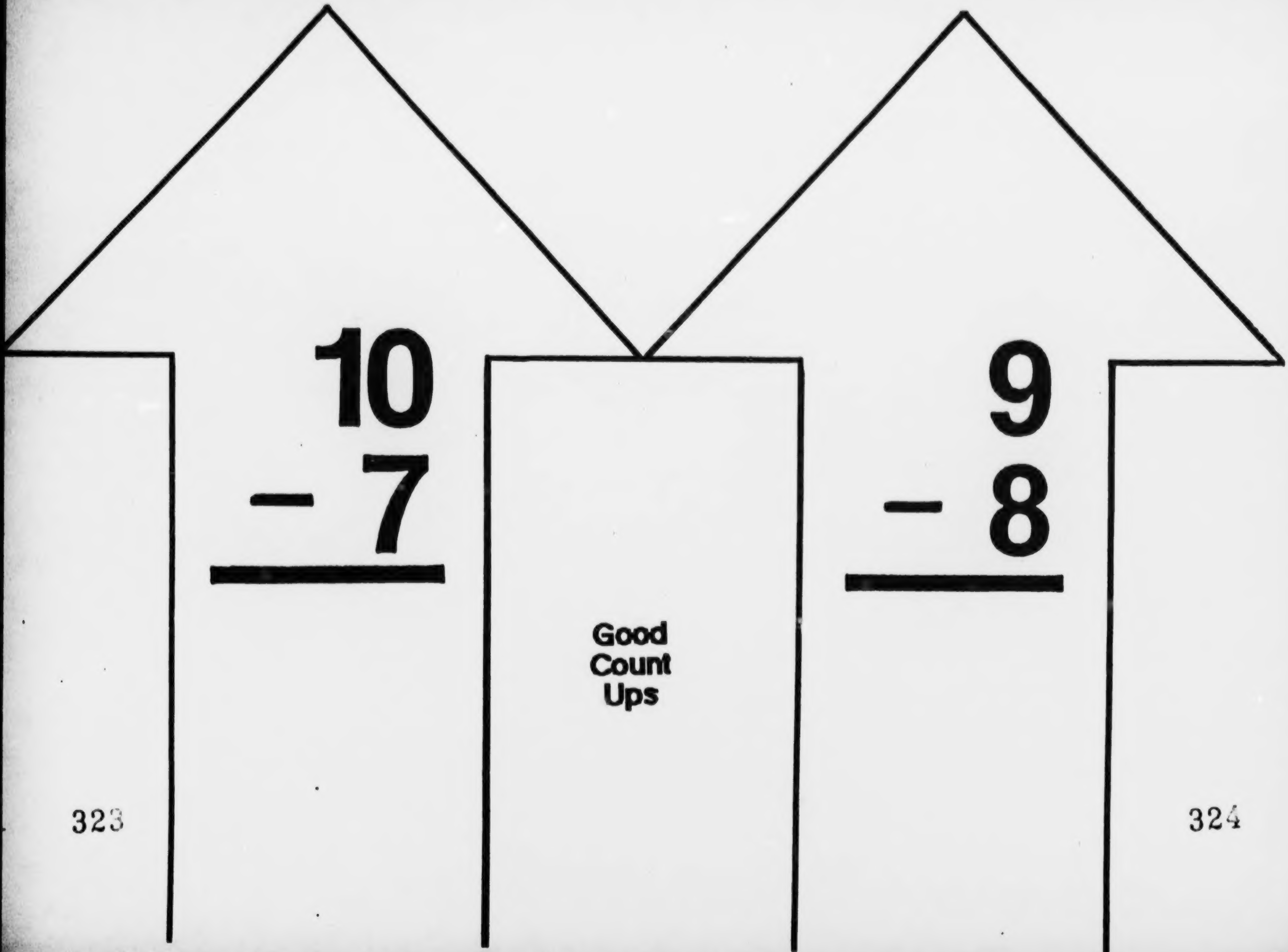
Good
Count
Ups

$$\begin{array}{r} 6 \\ -\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} 11 \\ -\ 8 \\ \hline \end{array}$$

Good
Count
Ups

$$\begin{array}{r} 11 \\ -\ 9 \\ \hline \end{array}$$



$$\begin{array}{r} 10 \\ -\ 7 \\ \hline \end{array}$$

Good
Count
Ups

$$\begin{array}{r} 9 \\ -\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} 10 \\ -\ 9 \\ \hline \end{array}$$

Good
Count
Ups

$$\begin{array}{r} 10 \\ -\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ -\ 5 \\ \hline \end{array}$$

Good
Count
Ups

$$\begin{array}{r} 7 \\ -\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ -\ 5 \\ \hline \end{array}$$

Good
Count
Ups

$$\begin{array}{r} 7 \\ -\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} 12 \\ -\ 9 \\ \hline \end{array}$$

Good
Count
Ups

$$\begin{array}{r} 5 \\ -\ 4 \\ \hline \end{array}$$

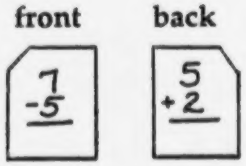
Subtract-Add to

Check Flash Cards

Cut each card to create four 2-sided number fact cards.

Notch cards as shown, for ease in telling when all subtraction problems are "up."

These cards are used in Add to Check activities throughout the subtraction lessons.



$$\begin{array}{r} 9 \\ -\ 0 \\ \hline \end{array} \qquad \begin{array}{r} 8 \\ -\ 0 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ -\ 0 \\ \hline \end{array} \qquad \begin{array}{r} 6 \\ -\ 0 \\ \hline \end{array}$$

$$\begin{array}{r} 0 \\ +\;8 \\ \hline \end{array}$$

$$\begin{array}{r} 0 \\ +\;9 \\ \hline \end{array}$$

$$\begin{array}{r} 0 \\ +\;6 \\ \hline \end{array}$$

$$\begin{array}{r} 0 \\ +\;7 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ -\ 0 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ -\ 0 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ -\ 0 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \\ -\ 0 \\ \hline \end{array}$$

$$\begin{array}{r} 0 \\ +\,4 \\ \hline \end{array}$$

$$\begin{array}{r} 0 \\ +\,5 \\ \hline \end{array}$$

$$\begin{array}{r} 0 \\ +\,2 \\ \hline \end{array}$$

$$\begin{array}{r} 0 \\ +\,3 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ -\ 0 \\ \hline \end{array}$$

$$\begin{array}{r} 0 \\ -\ 0 \\ \hline \end{array}$$

$$\begin{array}{r} 10 \\ -\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ -\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} 0 \\ +\ 0 \\ \hline \end{array}$$

$$\begin{array}{r} 0 \\ +\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ +\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ +\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ -\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ -\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ -\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ -\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ +\;6 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ +\;7 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ +\;4 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ +\;5 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ -\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ -\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \\ -\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ -\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ +\ 2 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ +\ 3 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ +\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ +\ 0 \\ \hline \end{array}$$

$$\begin{array}{r} 11 \\ -\ 2 \\ \hline \end{array}$$

$$\begin{array}{r} 10 \\ -\ 2 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ -\ 2 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ -\ 2 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \\ +\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \\ +\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \\ +\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \\ +\ 7 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ -\;2 \\ \hline \end{array} \qquad \begin{array}{r} 6 \\ -\;2 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ -\;2 \\ \hline \end{array} \qquad \begin{array}{r} 4 \\ -\;2 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \\ +\,4 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \\ +\,5 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \\ +\,2 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \\ +\,3 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ -\ 2 \\ \hline \end{array} \qquad \begin{array}{r} 2 \\ -\ 2 \\ \hline \end{array}$$

$$\begin{array}{r} 12 \\ -\ 3 \\ \hline \end{array} \qquad \begin{array}{r} 11 \\ -\ 3 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \\ +\ 0 \\ \hline \end{array} \qquad \begin{array}{r} 2 \\ +\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ +\ 8 \\ \hline \end{array} \qquad \begin{array}{r} 3 \\ +\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 10 \\ -\ 3 \\ \hline \end{array} \qquad \begin{array}{r} 9 \\ -\ 3 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ -\ 3 \\ \hline \end{array} \qquad \begin{array}{r} 7 \\ -\ 3 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ +\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ +\ 7 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ +\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ +\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ -\ 3 \\ \hline \end{array} \qquad \begin{array}{r} 5 \\ -\ 3 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ -\ 3 \\ \hline \end{array} \qquad \begin{array}{r} 3 \\ -\ 3 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ +\,2 \\ \hline \end{array} \qquad \begin{array}{r} 3 \\ +\,3 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ +\,0 \\ \hline \end{array} \qquad \begin{array}{r} 3 \\ +\,1 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ +\,4 \\ \hline \end{array} \qquad \begin{array}{r} 6 \\ +\,5 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ +\,2 \\ \hline \end{array} \qquad \begin{array}{r} 6 \\ +\,3 \\ \hline \end{array}$$

$$\begin{array}{r} 13 \\ -\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} 12 \\ -\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} 11 \\ -\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} 10 \\ -\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ +\,8 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ +\,9 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ +\,6 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ +\,7 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ -\,4 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ -\,4 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ -\,4 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ -\,4 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ +\,4 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ +\,5 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ +\,2 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ +\,3 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ -\ 4 \\ \hline \end{array} \qquad \begin{array}{r} 4 \\ -\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} 14 \\ -\ 5 \\ \hline \end{array} \qquad \begin{array}{r} 13 \\ -\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ +\ 0 \\ \hline \end{array} \qquad \begin{array}{r} 4 \\ +\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ +\ 8 \\ \hline \end{array} \qquad \begin{array}{r} 5 \\ +\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 12 \\ -\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 11 \\ -\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 10 \\ -\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ -\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ +\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ +\ 7 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ +\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ +\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ -\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ -\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ -\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ -\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ +\ 2 \\ \hline \end{array} \qquad \begin{array}{r} 5 \\ +\ 3 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ +\ 0 \\ \hline \end{array} \qquad \begin{array}{r} 5 \\ +\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} 15 \\ -\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 14 \\ -\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 13 \\ -\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 12 \\ -\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ +\,8 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ +\,9 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ +\,6 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ +\,7 \\ \hline \end{array}$$

$$\begin{array}{r} 11 \\ -\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 10 \\ -\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ -\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ -\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ -\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ -\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 16 \\ -\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 15 \\ -\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ +\ 0 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ +\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ +\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ +\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 14 \\ -\ 7 \\ \hline \end{array} \qquad \begin{array}{r} 13 \\ -\ 7 \\ \hline \end{array}$$

$$\begin{array}{r} 12 \\ -\ 7 \\ \hline \end{array} \qquad \begin{array}{r} 11 \\ -\ 7 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ +\,6 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ +\,7 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ +\,4 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ +\,5 \\ \hline \end{array}$$

$$\begin{array}{r} 10 \\ -\ 7 \\ \hline \end{array} \qquad \begin{array}{r} 9 \\ -\ 7 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ -\ 7 \\ \hline \end{array} \qquad \begin{array}{r} 7 \\ -\ 7 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ +\,2 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ +\,3 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ +\,0 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ +\,1 \\ \hline \end{array}$$

$$\begin{array}{r} 17 \\ -\ 8 \\ \hline \end{array} \qquad \begin{array}{r} 16 \\ -\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} 15 \\ -\ 8 \\ \hline \end{array} \qquad \begin{array}{r} 14 \\ -\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ +\,8 \\ \hline \end{array} \qquad \begin{array}{r} 8 \\ +\,9 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ +\,6 \\ \hline \end{array} \qquad \begin{array}{r} 8 \\ +\,7 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ +\,4 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ +\,5 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ +\,2 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ +\,3 \\ \hline \end{array}$$

$$\begin{array}{r} 13 \\ -\ 8 \\ \hline \end{array} \qquad \begin{array}{r} 12 \\ -\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} 11 \\ -\ 8 \\ \hline \end{array} \qquad \begin{array}{r} 10 \\ -\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ +\ 0 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ +\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ +\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ +\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ -\;8 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ -\;8 \\ \hline \end{array}$$

$$\begin{array}{r} 18 \\ -\;9 \\ \hline \end{array}$$

$$\begin{array}{r} 17 \\ -\;9 \\ \hline \end{array}$$

$$\begin{array}{r} 16 \\ -\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 15 \\ -\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 14 \\ -\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 13 \\ -\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ +\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ +\ 7 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ +\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ +\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ +\;2 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ +\;3 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ +\;0 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ +\;1 \\ \hline \end{array}$$

$$\begin{array}{r} 12 \\ -\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 11 \\ -\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 10 \\ -\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ -\ 9 \\ \hline \end{array}$$

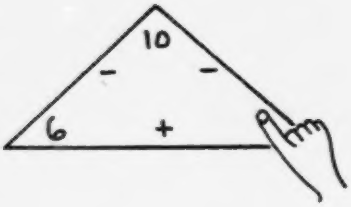
Finger Flash Card Sample Pattern

This card may be used as a blackline master to create additional cards. Each card may be cut to create twelve triangular finger flashcards.

The finger flashcards are used in:

- Add to Check
- Partner and
- Fact Family

work throughout the subtraction lessons.



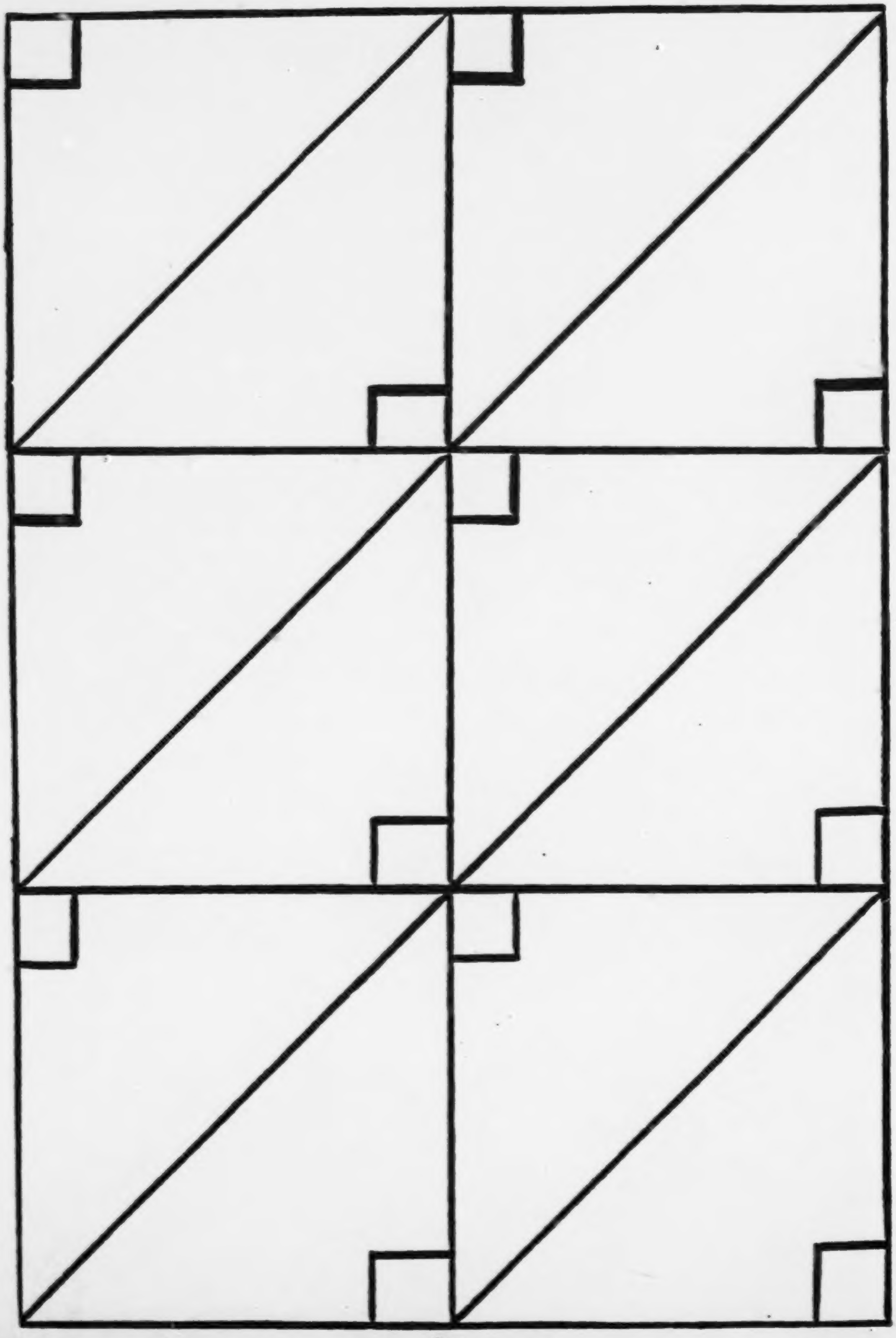
10 - 6 = 4

because 6 + 4 = 10.

(Lift finger to check.)

(For Finger Flashcards)

(For Finger Flashcards)

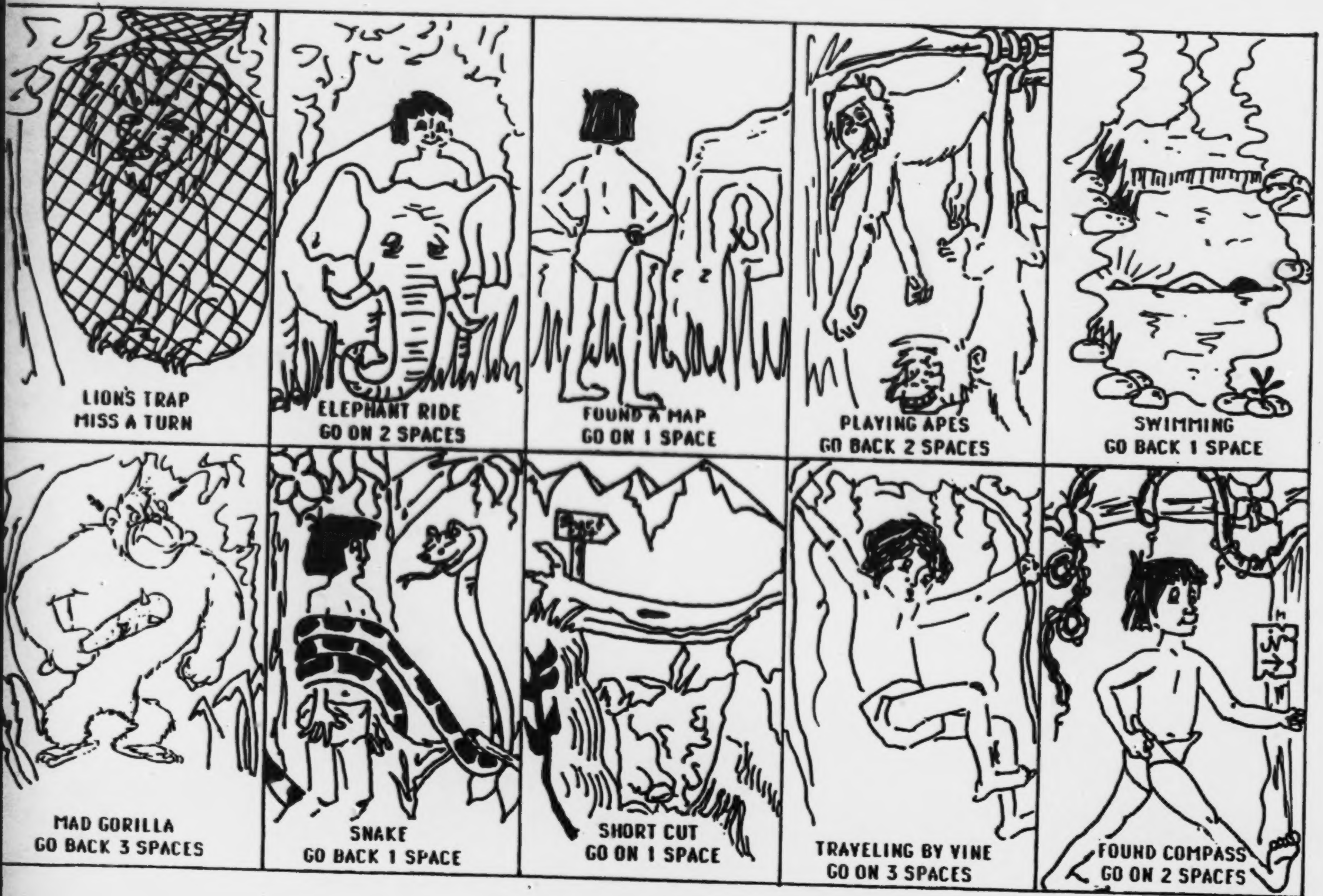


Blank Gamepath with Chance Cards

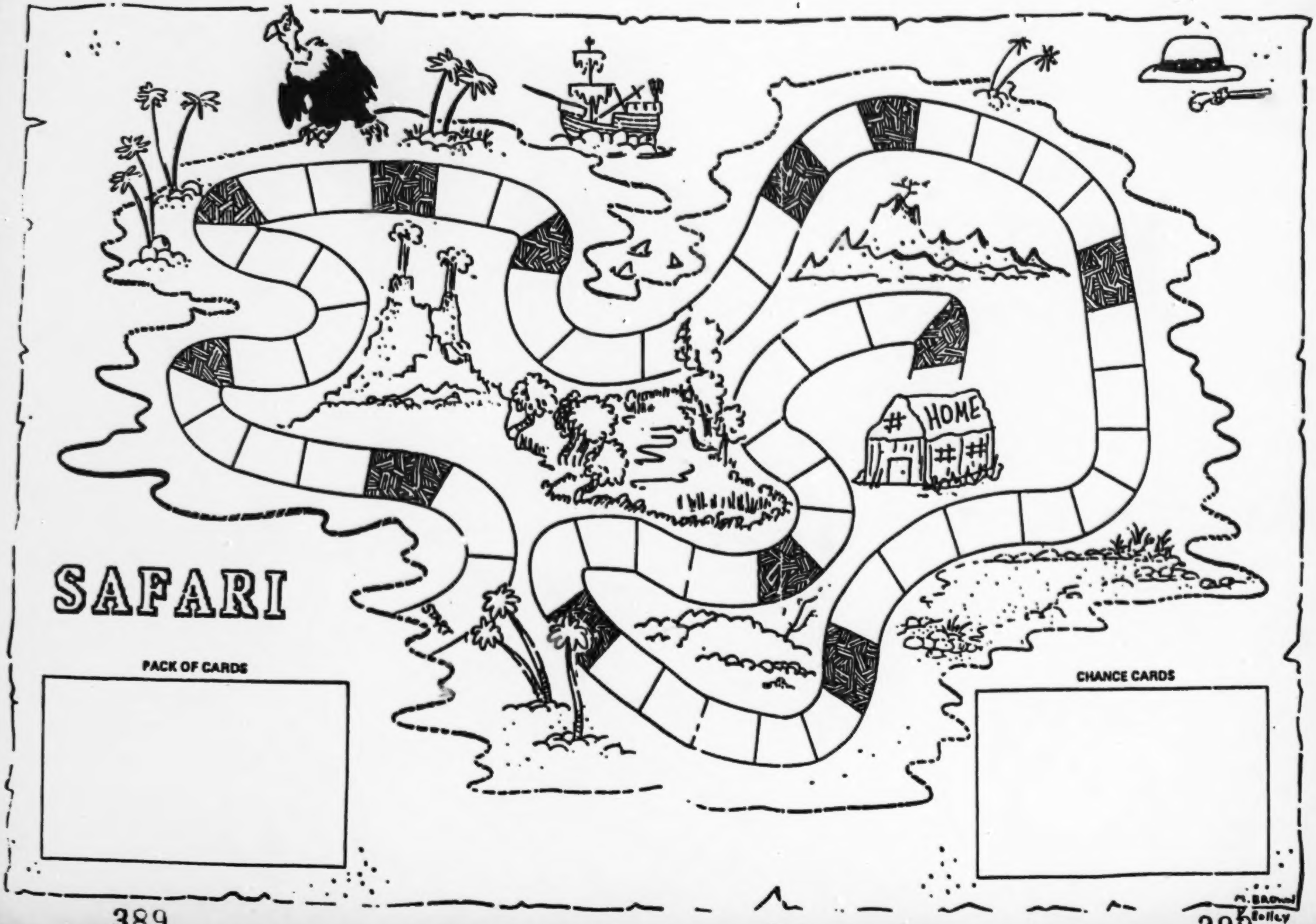
Cut out the 10 Chance Cards.

This sample board game is a popular small group activity, for home and school. Because each student could have their own deck of cards during game play, individual learning needs can be uniquely accommodated.

Specific directions for play appear in the overview to this section, "Using the Card Sets."


LION'S TRAP
MISS A TURN
ELEPHANT RIDE
GO ON 2 SPACES
FOUND A MAP
GO ON 1 SPACE
PLAYING APES
GO BACK 2 SPACES
SWIMMING
GO BACK 1 SPACE
MAD GORILLA
GO BACK 3 SPACES
SNAKE
GO BACK 1 SPACE
SHORT CUT
GO ON 1 SPACE
TRAVELING BY VINE
GO ON 3 SPACES
FOUND COMPASS
GO ON 2 SPACES

K. ROLLEY


SAFARI
HOME
START
PACK OF CARDS
CHANCE CARDS
M. BROWN
Bolley